Abbildungen Gruppe J

Einfach periodische Oberflächen

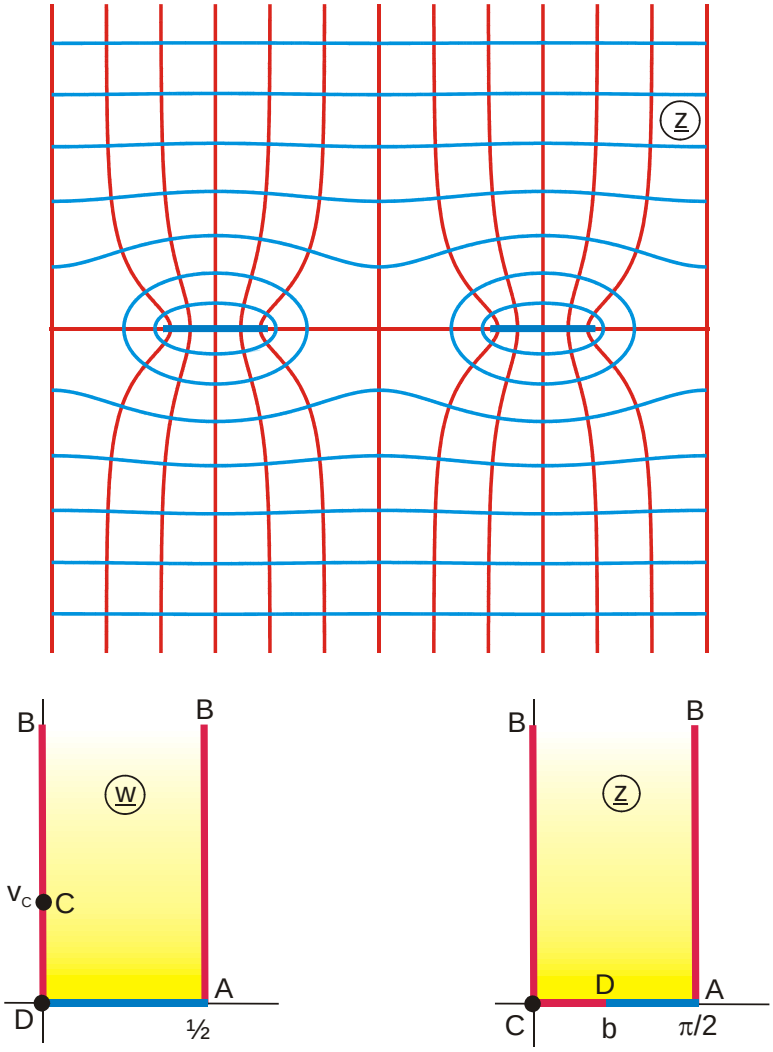


Abbildung J 1

$$z = \frac{\pi}{2} + j\,\mathrm{ar\,sinh}\left[j\sigma\cos(w\pi)\right]$$

$$b = \mathrm{ar\,sinh}(j\sigma)$$

$$v_C = \frac{1}{\pi}\,\mathrm{ar\,cosh}\frac{1}{\sigma}$$

$$\sigma = \sin b$$

$$0 \le u \le 1$$

$$0 \le v \le 3$$

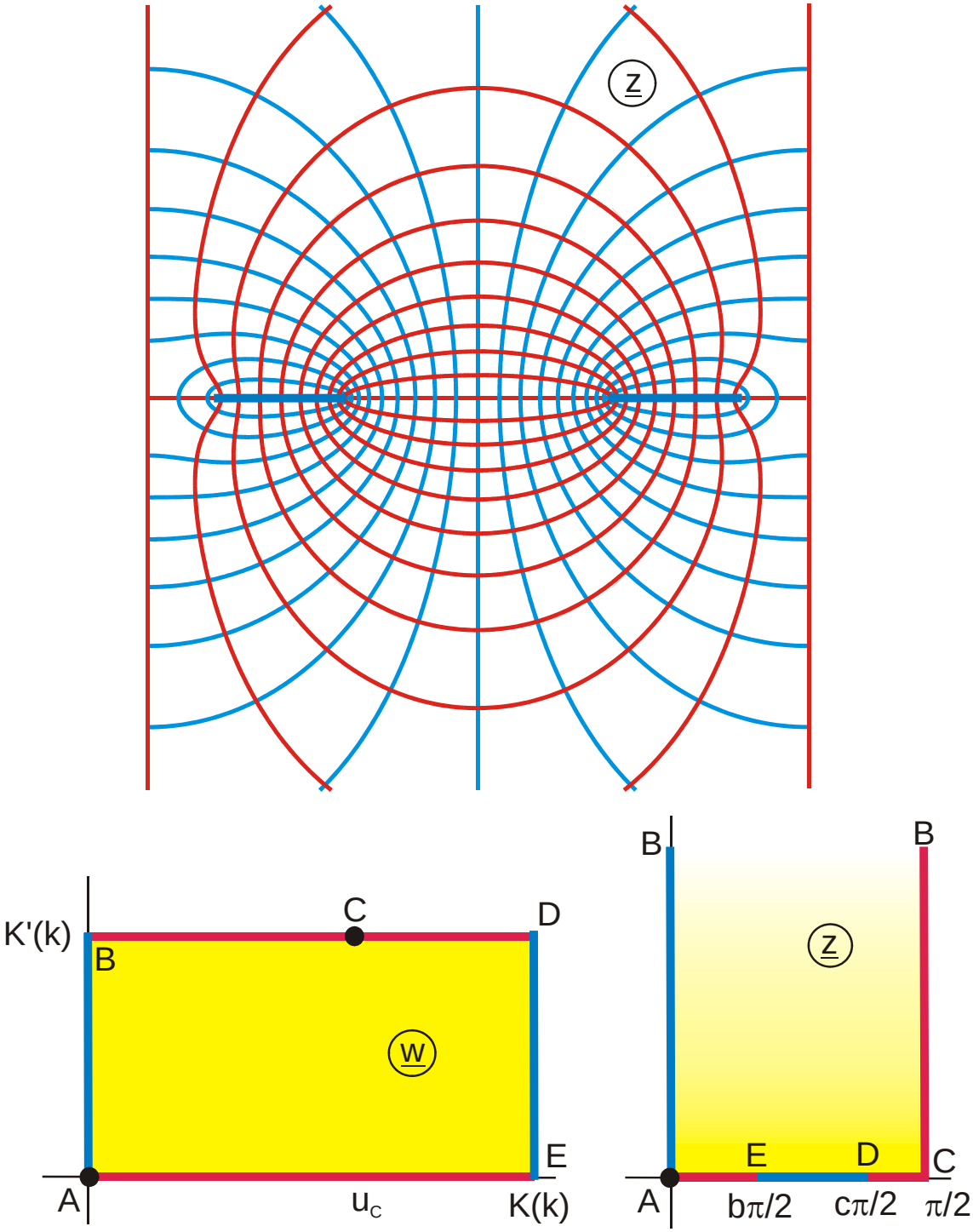


Abbildung J 1.1

$z = \arcsin [a\ k\ sn(w,k)]$

gegeben: b, c

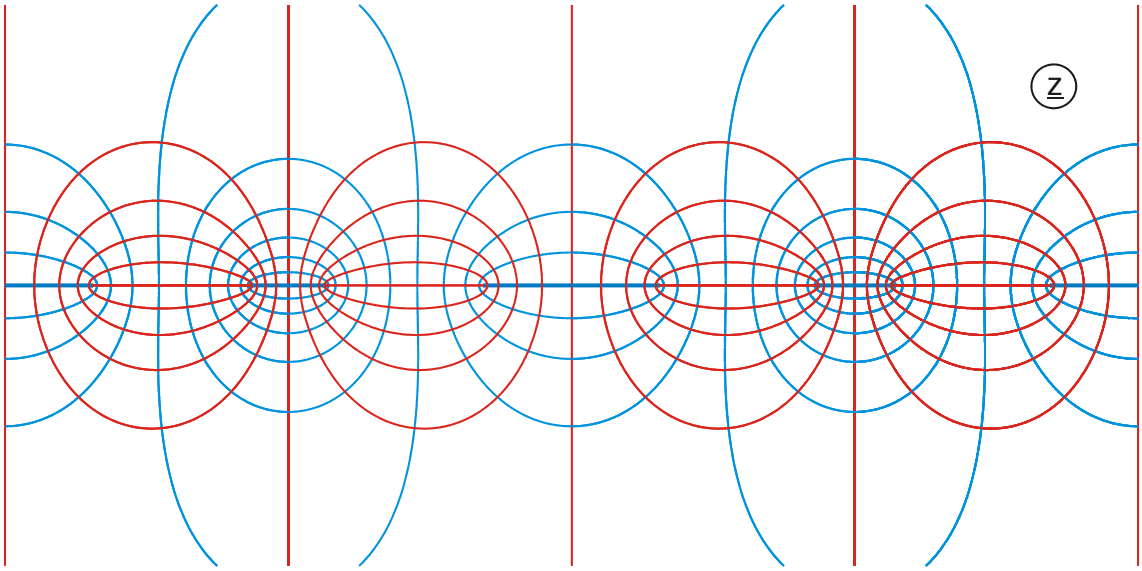
$$a = \sin\frac{c\pi}{2}$$

$$0 \le u \le K(k)$$

$$u_C = \mathrm{Re}\, F_a\left(\frac{1}{ak}, k\right)$$

$$k = \frac{1}{a}\sin\frac{b\pi}{2}$$

$$0 \le v \le K'(k)$$



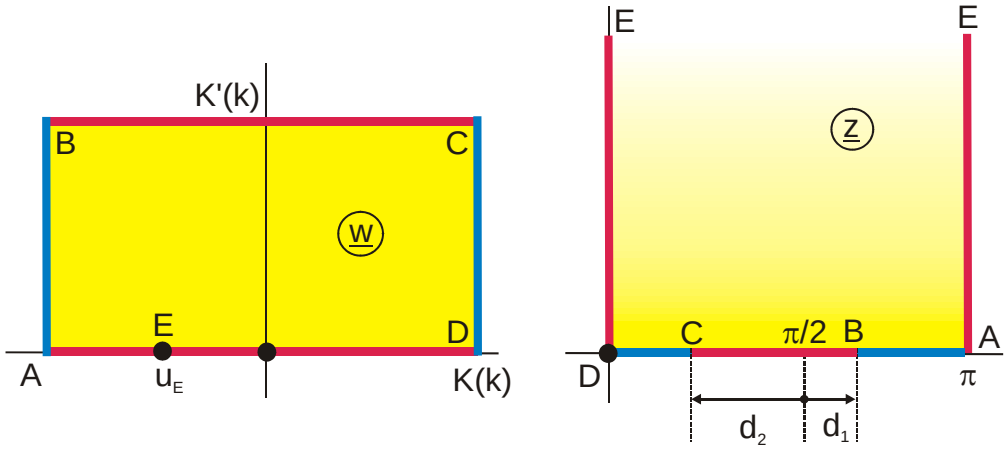


Abbildung J 1.2

$z = \arcsin(w_1) + \pi/2$

$$w_1 = -\frac{k + \sigma\,\mathrm{sn}(w,k)}{\sigma + k\,\mathrm{sn}(w,k)}$$

$-K(k) \le u \le K(k)$

$0 \le v \le K'(k)$

$$d_1 = \arcsin\frac{k^2 - \sigma}{k(1-\sigma)}$$

$$d_2 = \arcsin\left(-\frac{k^2 + \sigma}{k(1+\sigma)}\right)$$

$a_1 = \sin d_1$

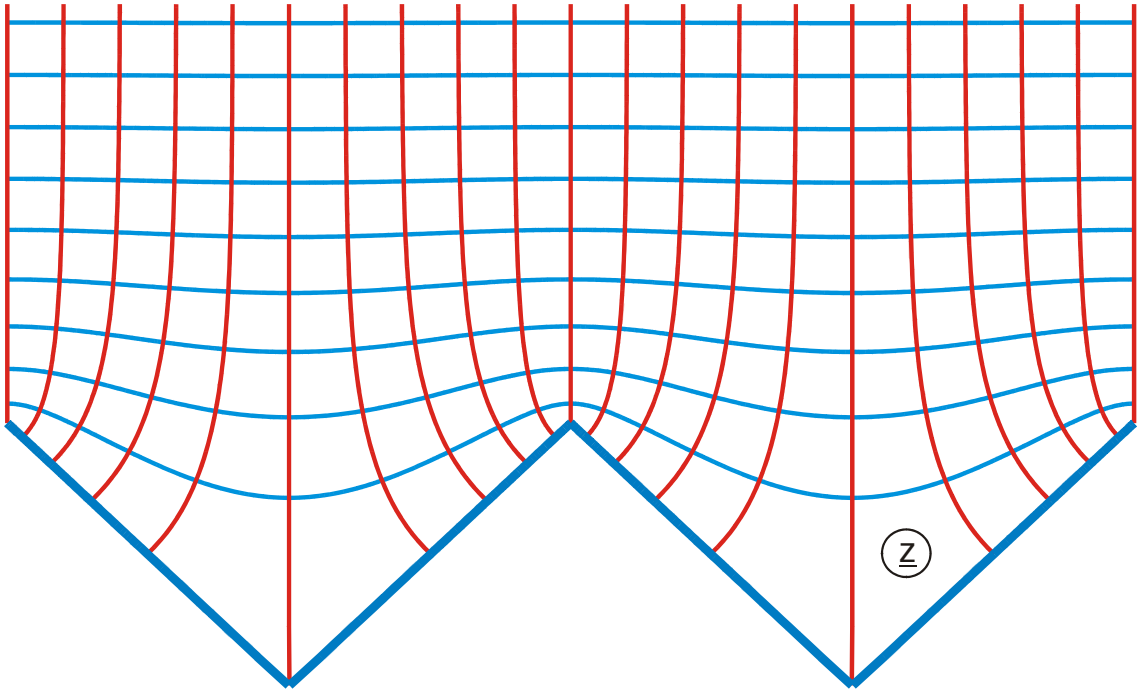
$a_2 = \sin d_2$

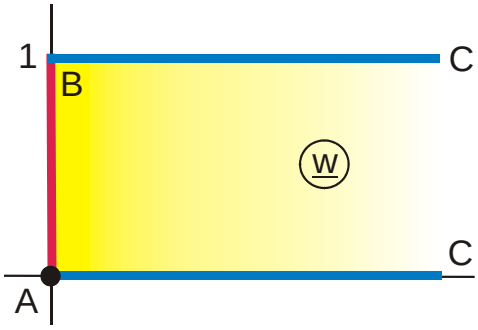
$$a = \frac{1 - a_1 a_2}{a_1 - a_2}$$

$$\sigma = k\frac{k - a_1}{1 - k a_1}$$

$$k = a - \sqrt{a^2 - 1}$$

$$u_E = F_a\left(-\frac{\sigma}{k}, k\right)$$





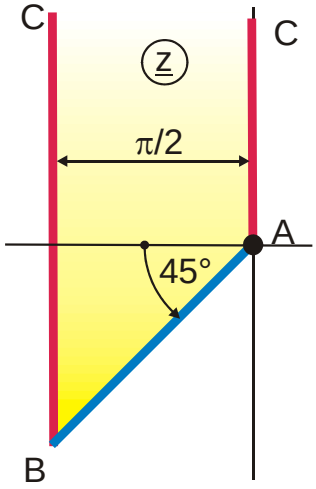


Abbildung J 2

$$z = j\left(\operatorname{ar\,tanh} w_2 - \arctan w_2\right)$$

$$w_2 = \left(1 + j/w_1\right)^{1/4} \qquad w_1 = -\frac{j}{2}\left[1 + \cosh(w\pi)\right]$$

$$0 \le u \le 2 \qquad 0 \le v \le 1$$

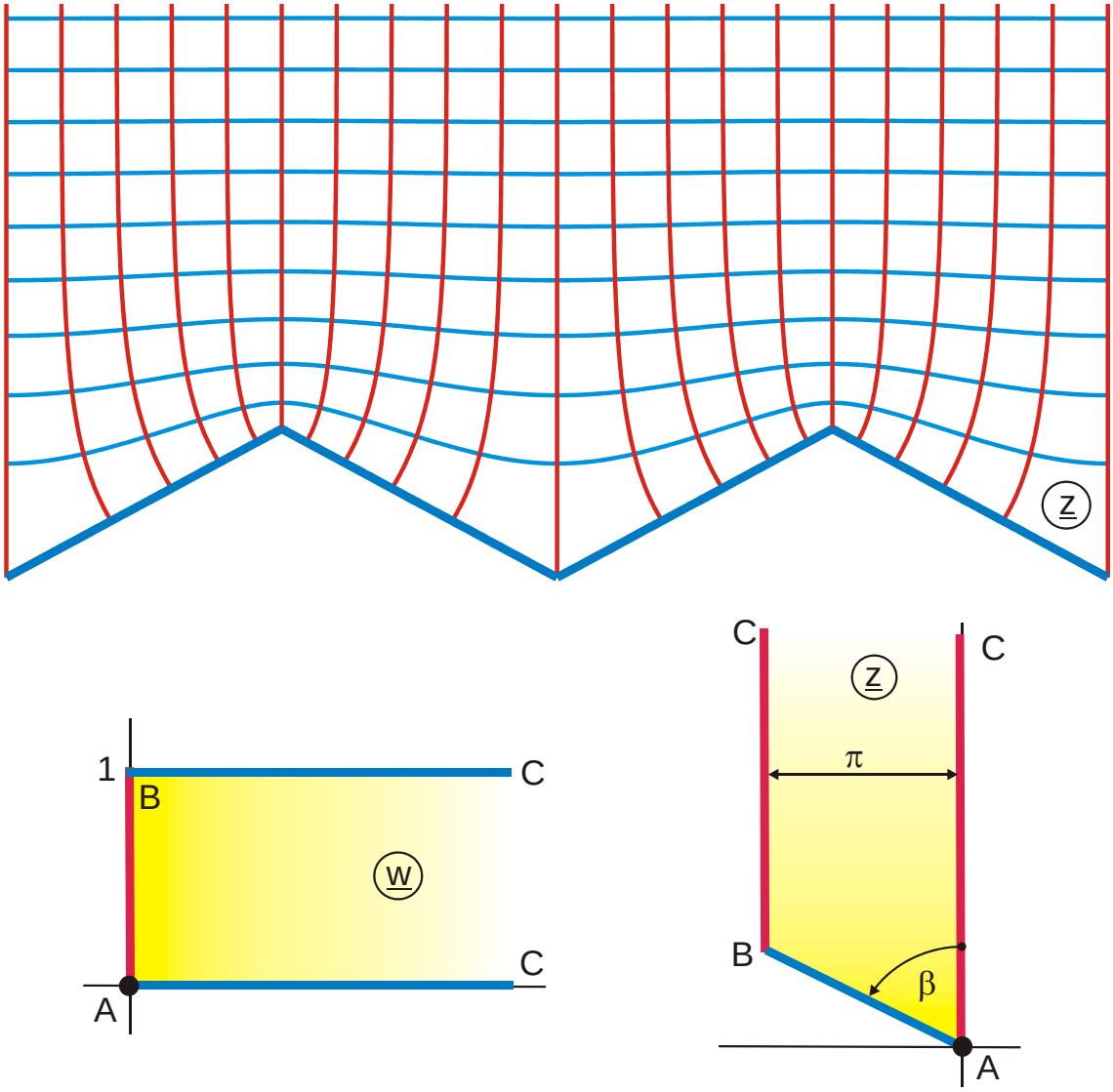


Abbildung J 2.1

$$z = j\sum_{i=0}^{q-1}\left[-t^{p}\ln\left(1-\frac{w_2}{t}\right)\right]$$

$$w_1 = \frac{1}{2}\left[1+\cosh(w\pi)\right]$$

$$w_2 = \left(1-1/w_1\right)^{1/q}$$

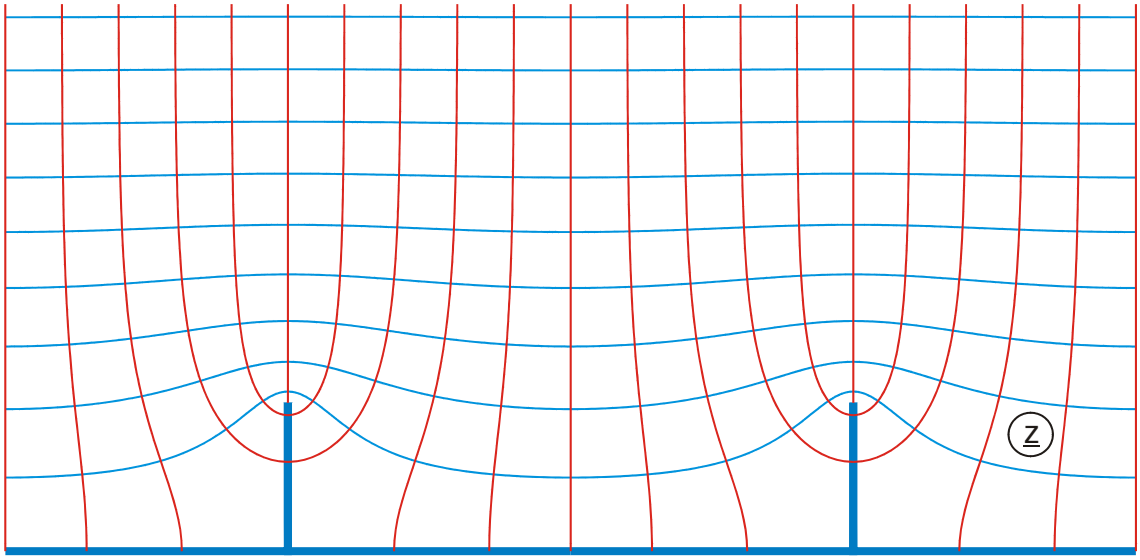
$$t(i) = \exp\left(\frac{j2\pi i}{q}\right)$$

$0 \le u \le 2$

$0 \le v \le 1$

gegeben: p, q >0 und ganzzahlig

$\beta = \pi\, p/q$



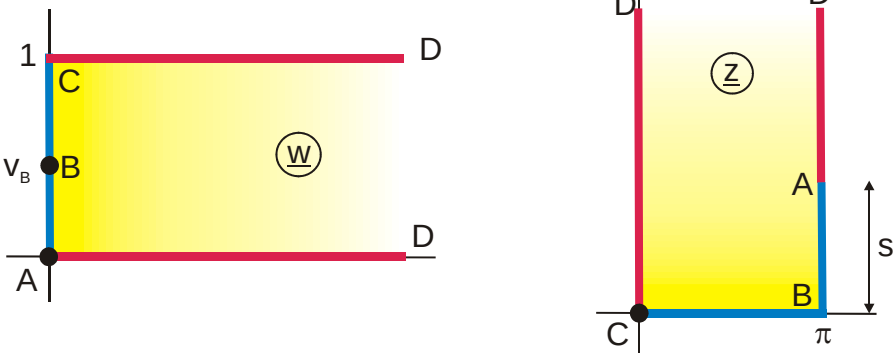


Abbildung J 3

$$z = \arcsin(w_1) + \frac{\pi}{2}$$

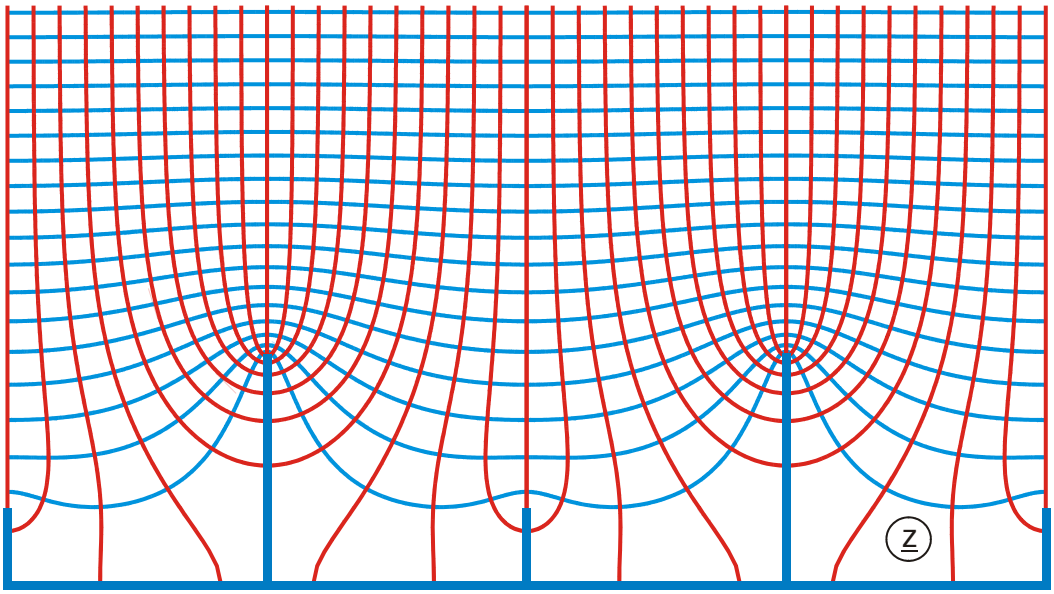
$$w_1 = a\left[\cosh(w\pi) + 1\right] - 1$$

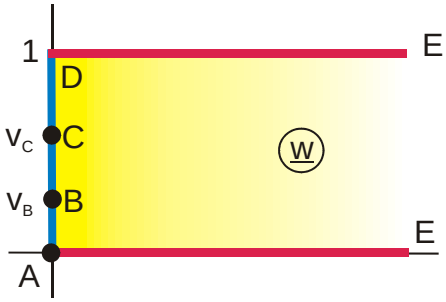
$$v_B = \frac{1}{\pi}\arccos\left(\frac{2}{a} - 1\right)$$

$$a = \frac{1}{2}\left[1 + \cosh s\right]$$

$$0 \le u \le 2$$

$$0 \le v \le 1$$





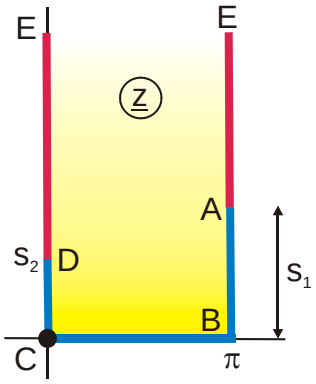


Abbildung J 3.1

$$z = \frac{\pi}{2} + \arcsin(w_1)$$

$$w_1 = \frac{a}{2}\cosh(w\pi) + b$$

$0 \le u \le 2$

$$a = \cosh(s_1) + \cosh(s_2)$$

$$v_B = \frac{1}{\pi}\arccos\left[\frac{2}{a}(1-b)\right]$$

$0 \le v \le 1$

$$b = \left[\cosh(s_1) - \cosh(s_2)\right]/2$$

$$v_C = \frac{1}{\pi}\arccos\left[-\frac{2}{a}(1+b)\right]$$

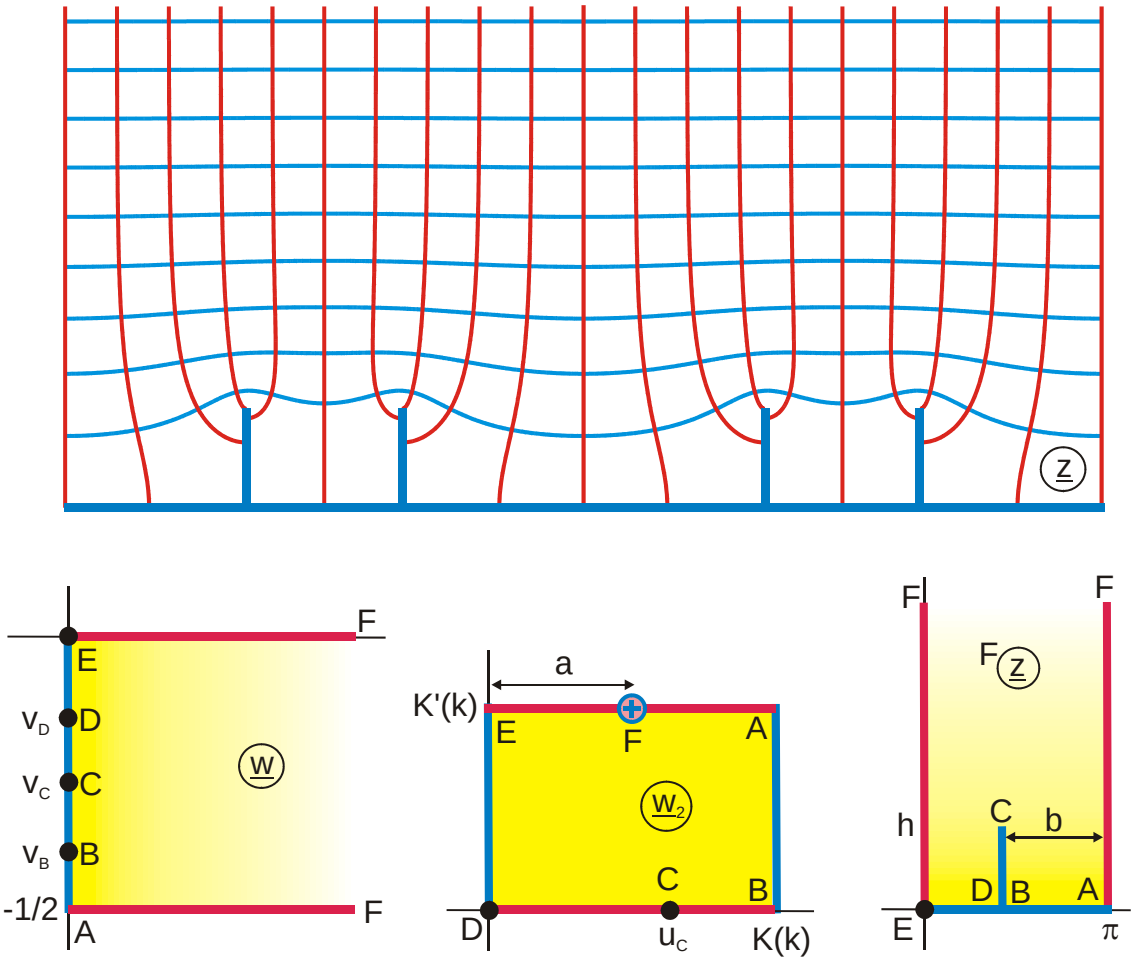


Abbildung J 3.2

$$z = j \ln \frac{\vartheta_4\left\{\frac{\pi}{2K(k)}(w_2 + a), k\right\}}{\vartheta_4\left\{\frac{\pi}{2K(k)}(w_2 - a), k\right\}} + \pi - b$$

$$w_2 = j\left[K'(k) - F_a(w_1, k')\right]$$

$$w_1 = j\, h_1 \tanh(w\pi)$$

$$a = b\, K(k)/\pi$$

$$h_1 = \mathrm{Im}\, sn(ja, k')$$

$$u_C = F_a\left(\sqrt{\sigma}, k\right)$$

$$\sigma = \frac{Z_e(a,k)}{k^2 sn(a,k)\{cn(a,k)dn(a,k) + sn(a,k)Z_e(a,k)\}}$$

$$v_B = -\frac{1}{\pi}\arctan\frac{1}{k'h_1}$$

$$h = \ln \frac{\vartheta_4\left\{\frac{\pi}{2K(k)}(u_C + a), k\right\}}{\vartheta_4\left\{\frac{\pi}{2K(k)}(u_C - a), k\right\}}$$

$$v_B = -\frac{1}{\pi}\arctan\frac{1}{h_1}$$

$0 \le u \le 1{,}5$

$-0{,}5 \le v \le 0$

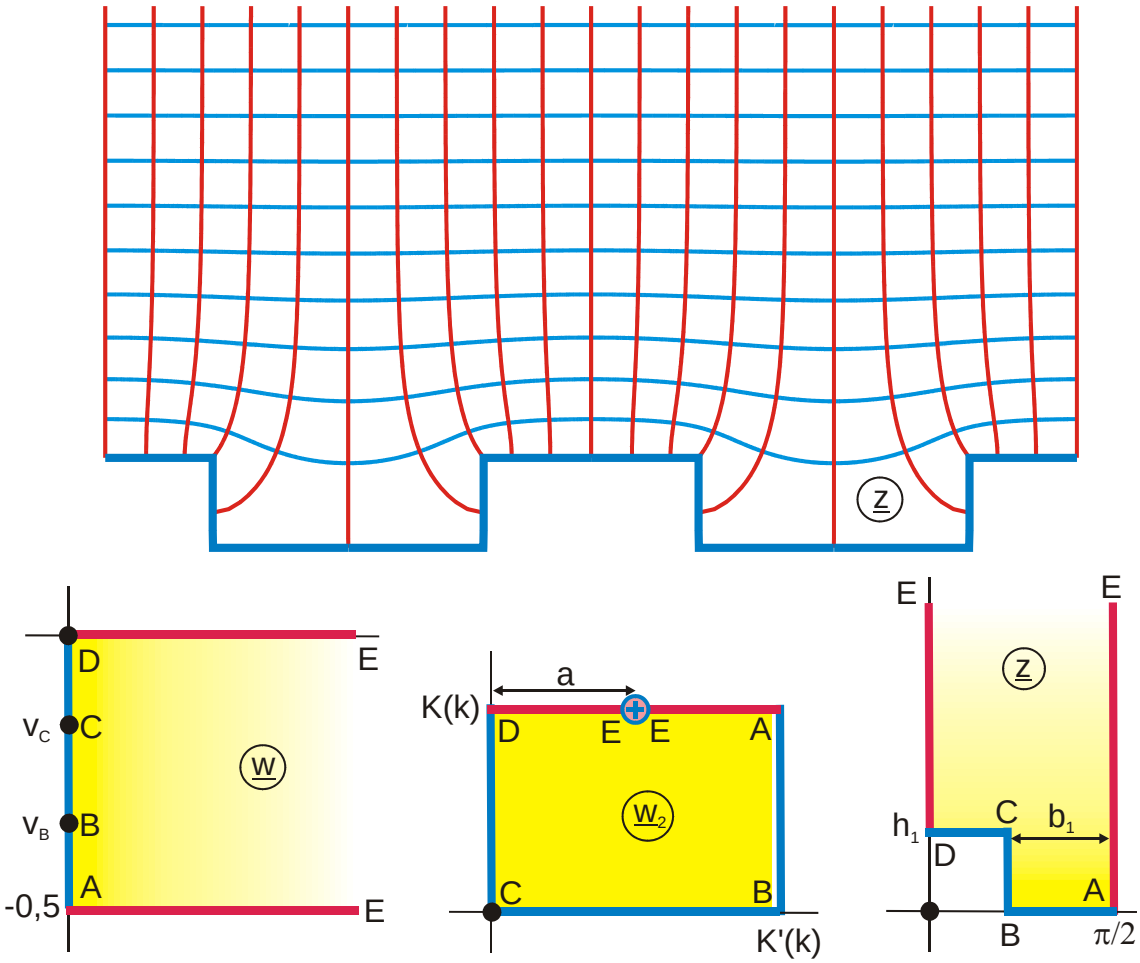


Abbildung J 3.3

$z = j\,(h_1 - w_3) + \pi/2 - b_1$

$w_2 = j\left[K'(k) - F_a(w_1, k')\right]$

$w_1 = j\ h\ \tanh(w\pi)$

$w_3 = \Pi_j\left(w_2, k', a\right)$

gegeben: b, k

$0 < b < K'(k)/K(k)$

$h = \mathrm{Im}\ \mathrm{sn}\left(jb\ K(k), k'\right)$

$h_1 = K'(k)\ Z_e\left(a, k'\right)$

$b_1 = K(k)\ Z_e(a, k') + \dfrac{\pi a}{2K'(k)}$

$a = b\ K(k)$

$v_C = -\dfrac{1}{\pi}\arctan\dfrac{1}{hk}$

$v_B = -\dfrac{1}{\pi}\arctan\dfrac{1}{h}$

$0 \le u \le 0{,}6$

$-0{,}5 \le v \le 0$

Abbildungen Gruppe K

Eine endlich und eine unendlich ausgedehnte Elektrode, entgegengesetzt gleich große Ladung

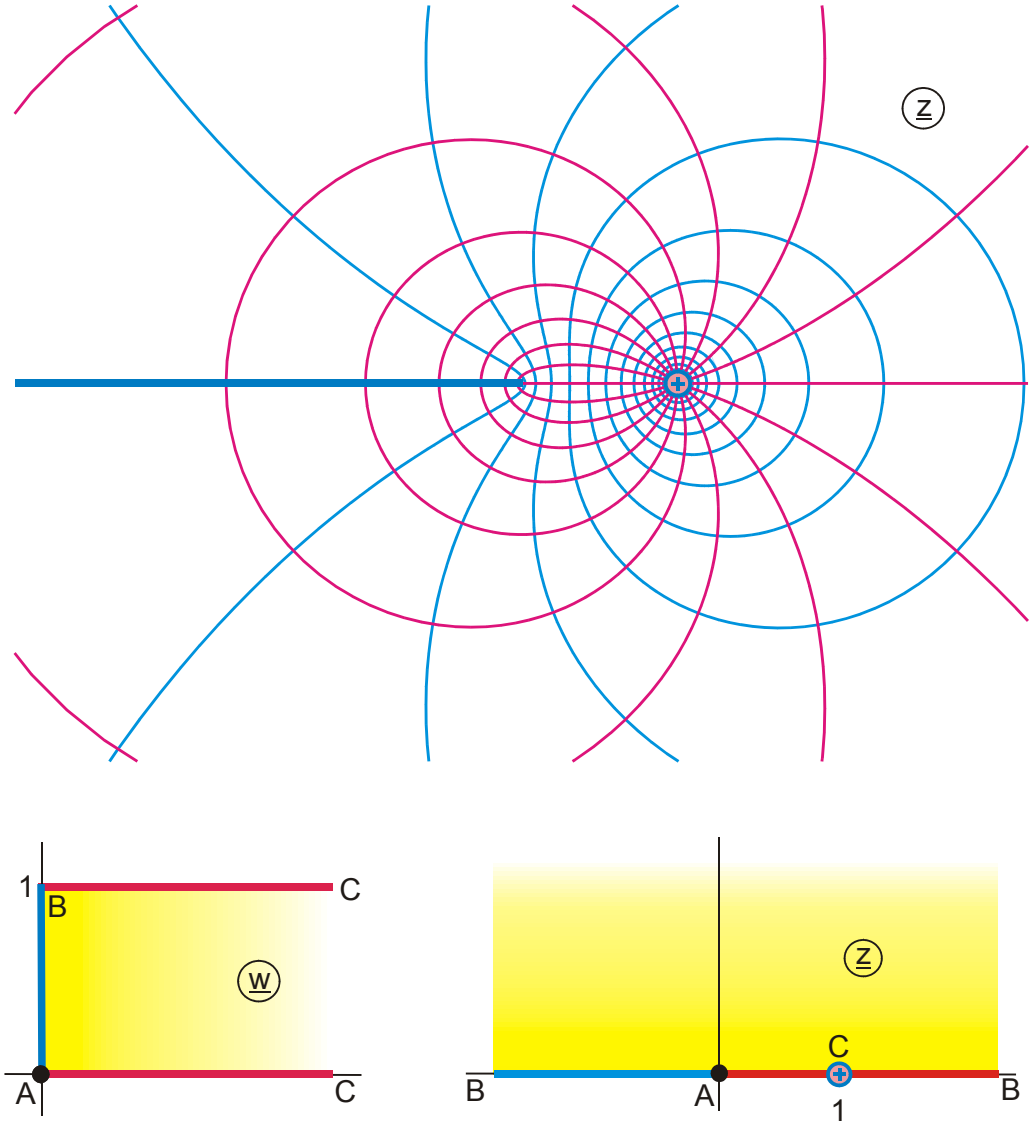


Abbildung K 1

$$z = w_1^{\,2} \qquad w_1 = \frac{E-1}{E+1}$$

$$E = \exp(w\pi) \qquad z = \tanh^2 \frac{w\pi}{2}$$

$$0 \le u \le u_e \qquad 0 \le v \le 1$$

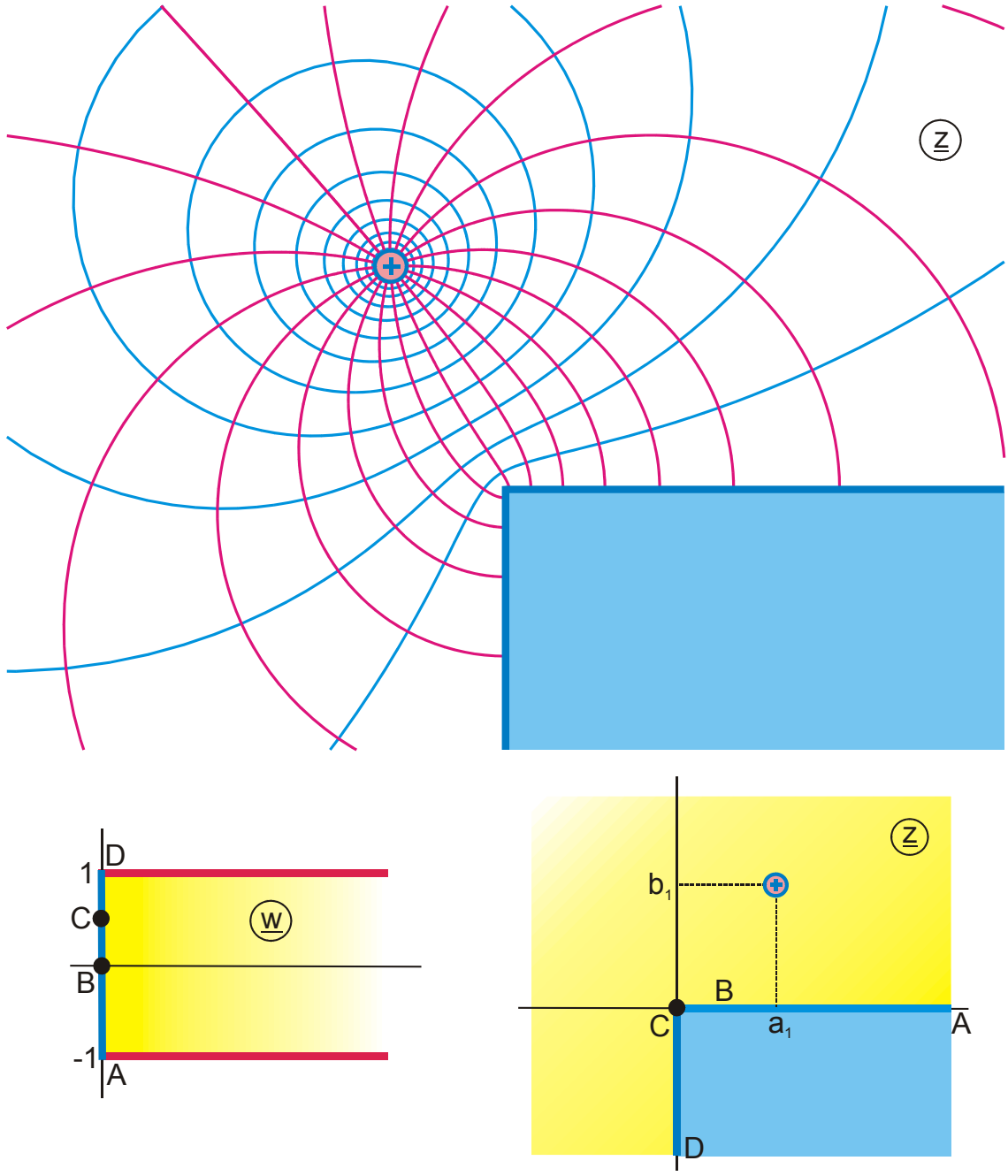


Abbildung K 1.1

$z = w_2^{3/2}$

$w_2 = a + jbw_1$

$w_1 = \tanh\frac{w\pi}{2}$

$a + jb = (a_1 + jb_1)^{2/3}$

$v_C = \frac{2}{\pi}\arctan\frac{a}{b}$

$b_1 \geq 0$

$0 \leq u \leq 1{,}2$

$-1 \leq v \leq 1$

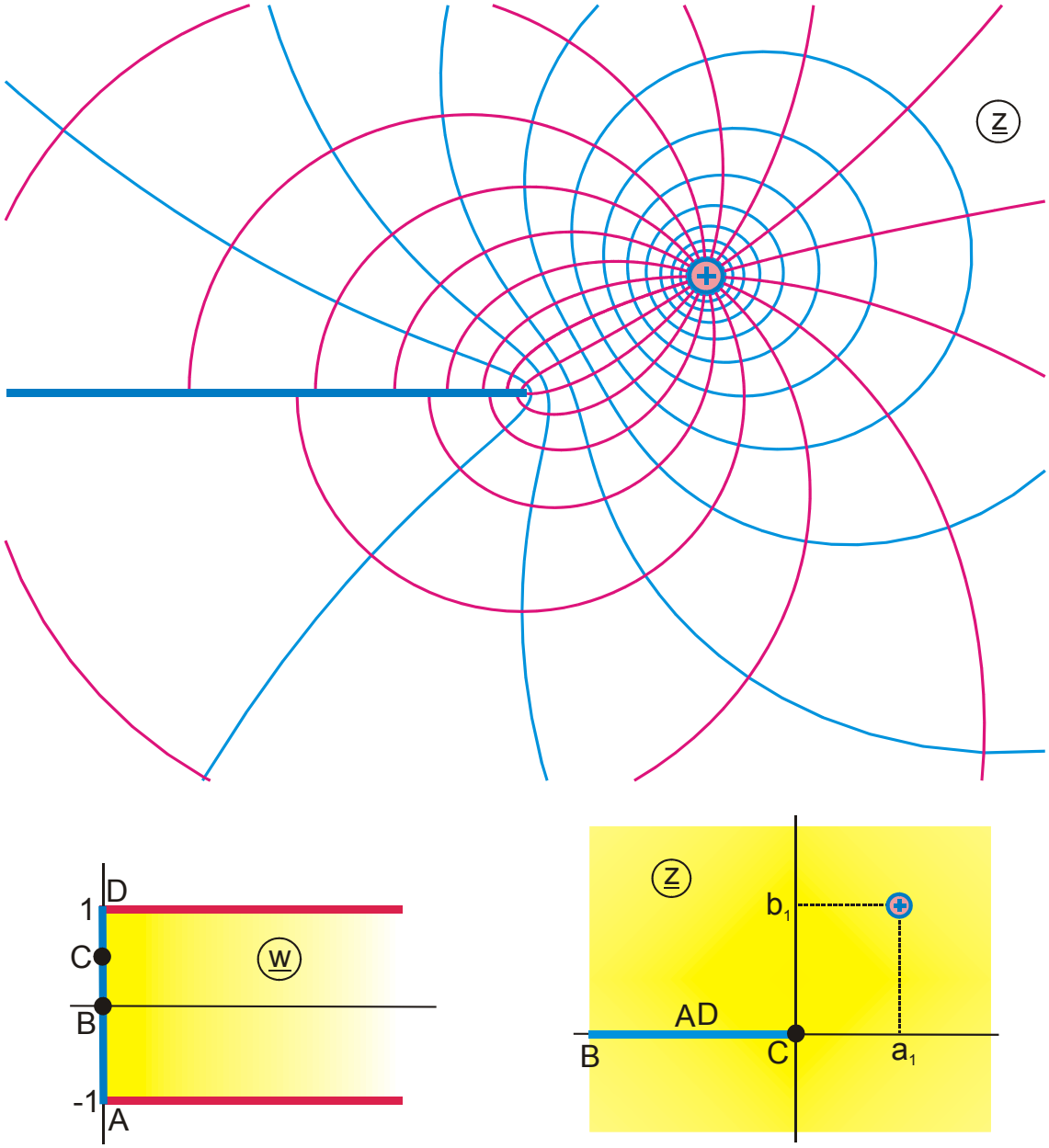


Abbildung K 1.2

$$z = w_1^{\,2}$$

$$w_1 = a\frac{1+E}{1-E} + jb$$

$$E = \exp(w\pi)$$

$$a + jb = \sqrt{a_1 - jb_1}$$

$$v_C = -\frac{2}{\pi}\arctan\frac{a}{b}$$

$$0 \le u \le 1{,}2$$

$$-1 \le v \le 1$$

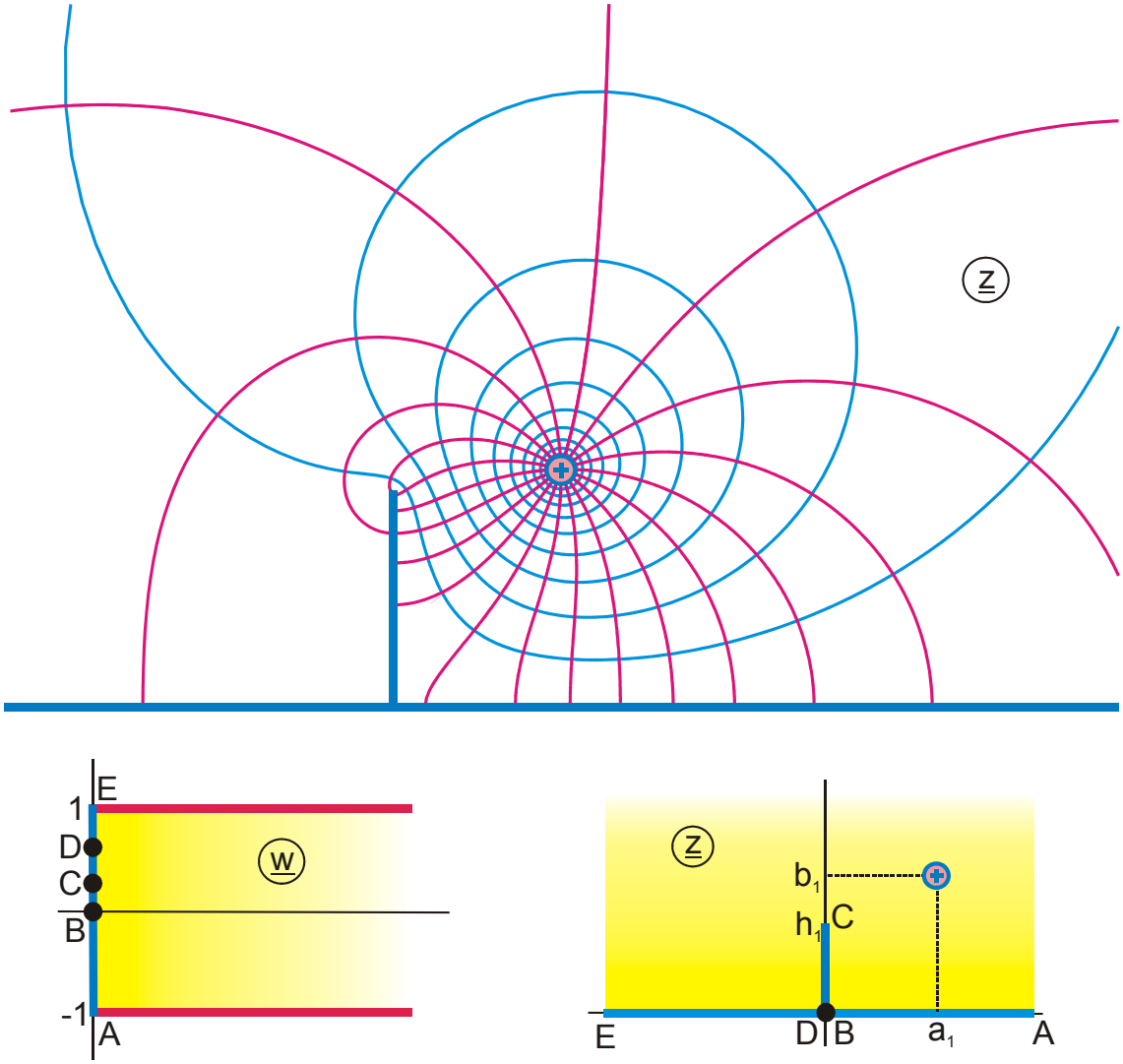


Abbildung K 1.3

$z = \sqrt{w_2^{\,2} - h}$

$w_2 = a + jbw_1$

$w_1 = \tanh\frac{w\pi}{2}$

$a + jb = \sqrt{h + (a_1 + jb_1)^2}$

$v_C = \frac{2}{\pi}\arctan\frac{a}{b}$

$a_1, b_1 > 0$

$h = h_1^{\,2}$

$0 \le u \le 1{,}2$

$-1 \le v \le 1$

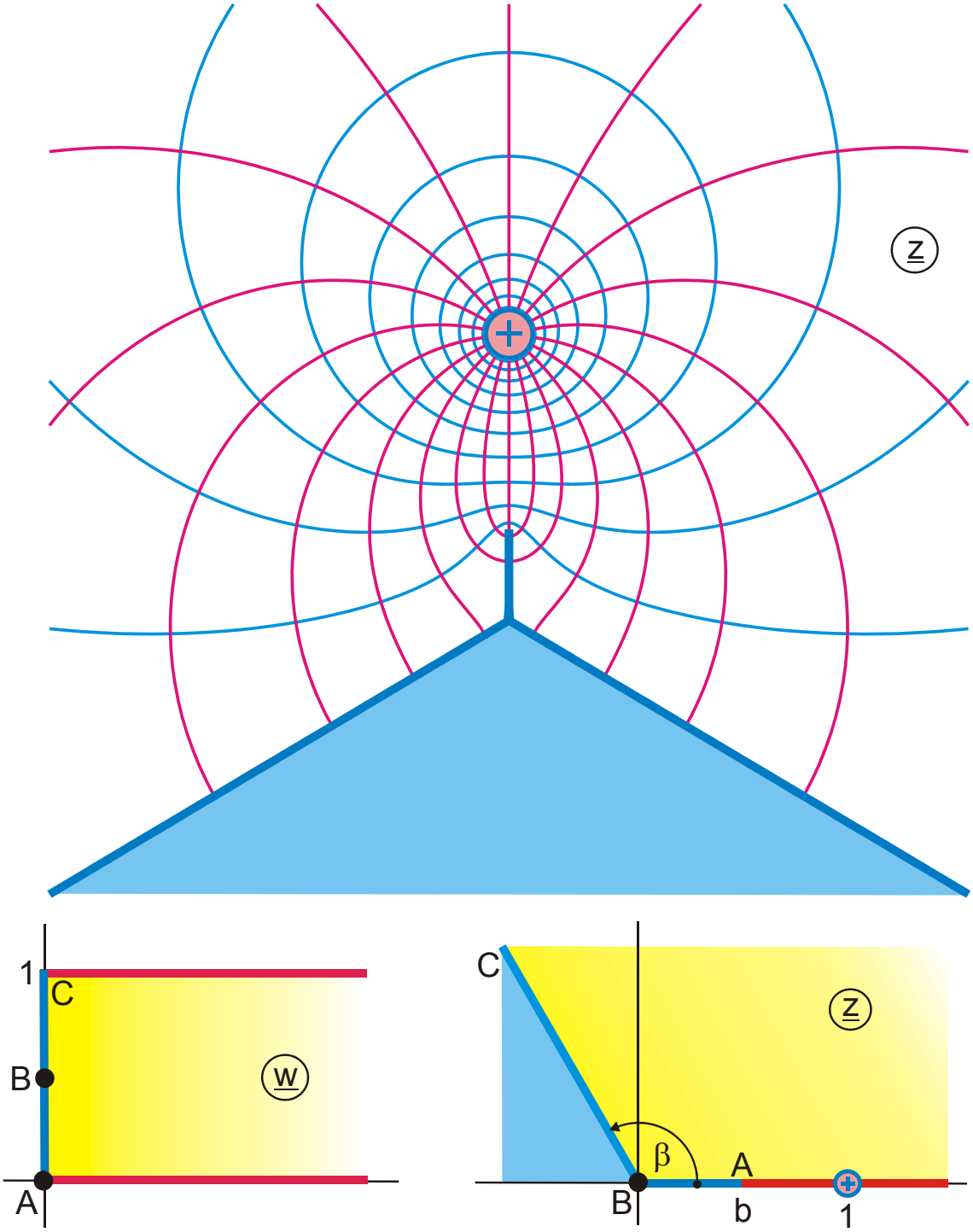


Abbildung K 1.4

$$z = \left(\frac{w_1^{\,2} + h}{1 + h} \right)^{\beta/\pi} \qquad w_1 = \frac{E - 1}{E + 1}$$

$$E = \exp(w\pi) \qquad h = \frac{b^{\pi/\beta}}{1 - b^{\pi/\beta}}$$

$$v_B = \frac{2}{\pi} \arctan\sqrt{h} \qquad 0 \le u \le 1 \qquad 0 \le v \le 1$$

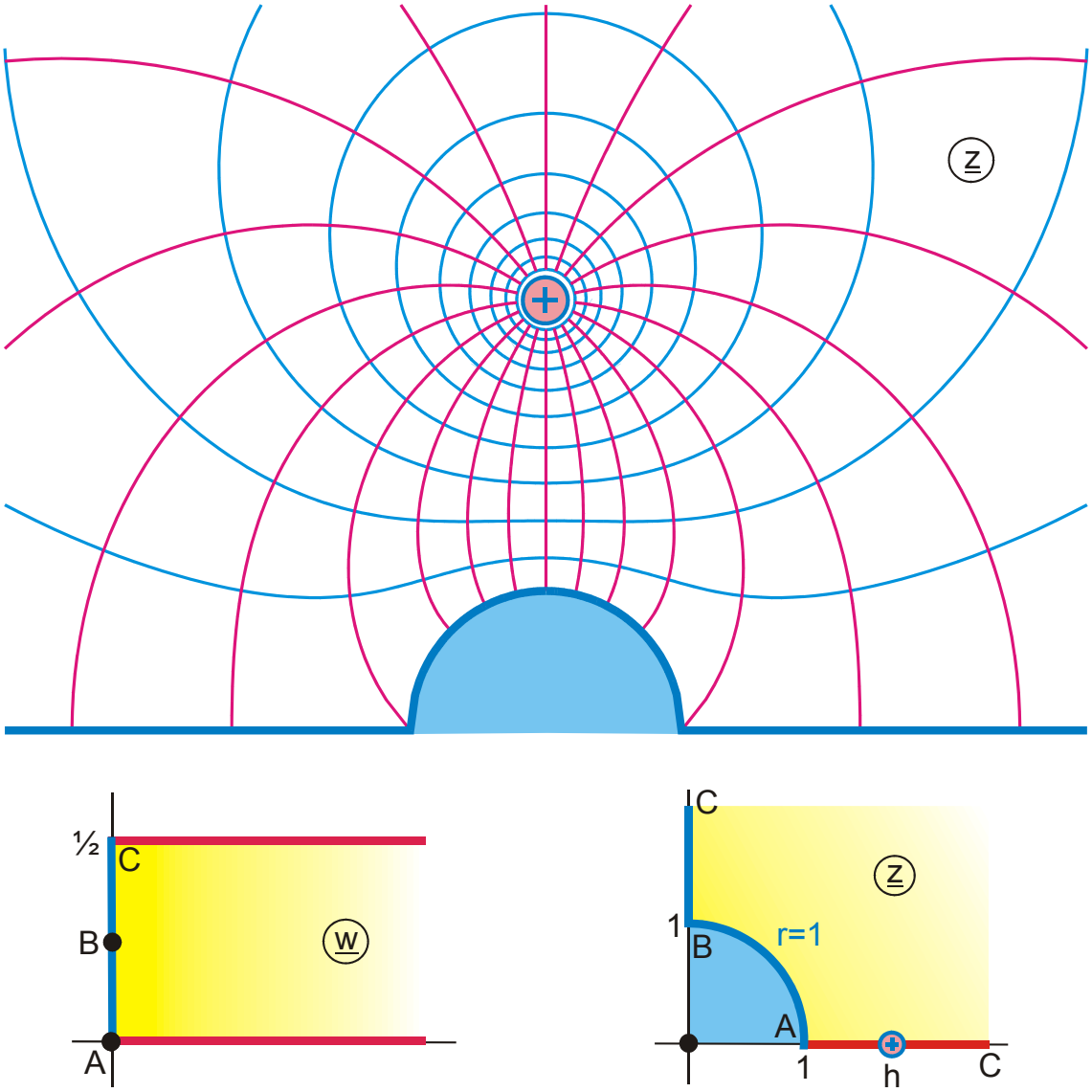


Abbildung K 1.5

$z = \exp w_1$

$a = \sinh \ln h = \dfrac{h^2 - 1}{2h}$

$0 \le u \le 0{,}5$

$w_1 = ar\sinh\left[a \tanh\left(w\pi\right)\right]$

$v_B = \dfrac{1}{\pi}\arctan\dfrac{1}{a}$

$0 \le v \le 0{,}5$

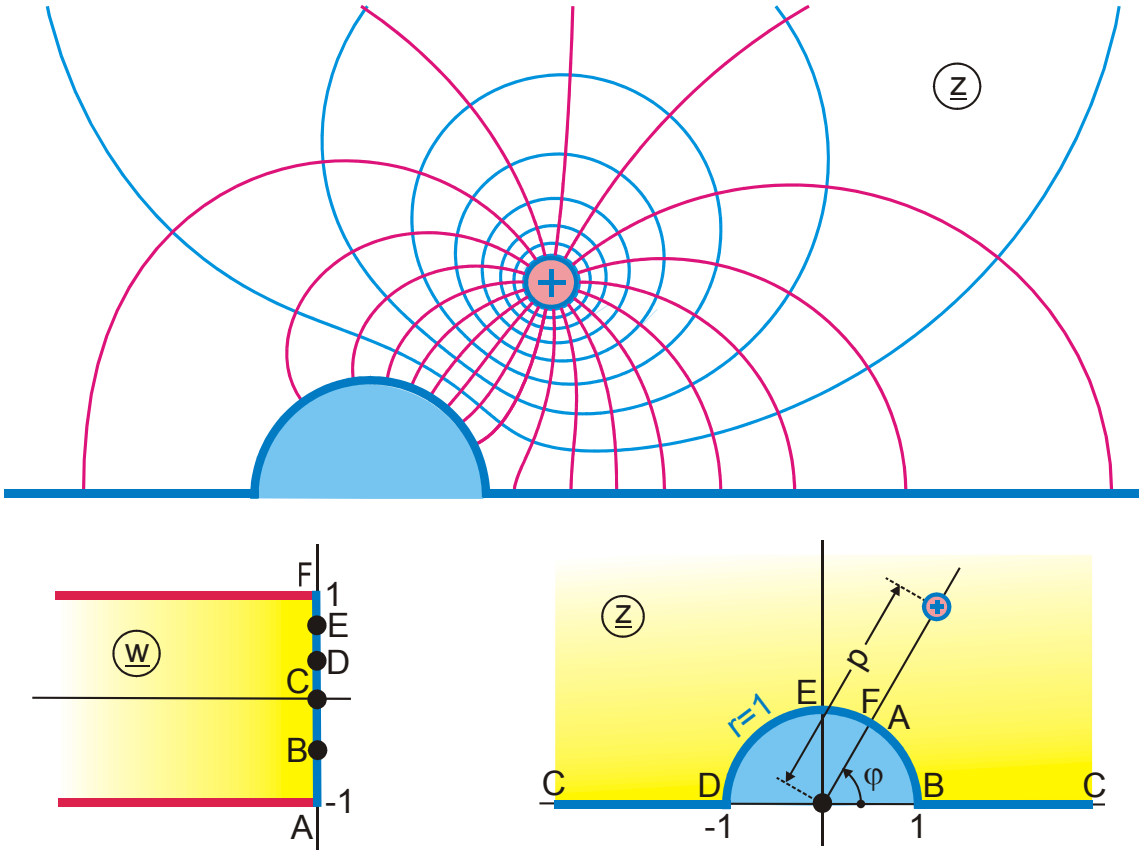


Abbildung K 1.6

$$z = \sqrt{d^2 - 1} - d \qquad d = \frac{b}{2a}$$

$$b = e^{j\varphi}\left[\frac{\exp(w\pi)}{p} - p\right] + e^{-j\varphi}\left[p\exp(w\pi) - \frac{1}{p}\right] \qquad a = 1 - \exp(w\pi)$$

$$v_B = \frac{1}{\pi}\,\mathrm{Im}\ln\frac{1 + \left(pe^{j\varphi}\right)^2 - 2pe^{j\varphi}}{p^2 + e^{j2\varphi} - 2pe^{j\varphi}} \qquad v_E = \frac{1}{\pi}\,\mathrm{Im}\ln\frac{1 + \left(pe^{j\varphi}\right)^2}{p^2 + e^{j2\varphi}}$$

$$v_D = \frac{1}{\pi}\,\mathrm{Im}\ln\frac{1 + \left(pe^{j\varphi}\right)^2 + 2pe^{j\varphi}}{p^2 + e^{j2\varphi} + 2pe^{j\varphi}}$$

$-0{,}8 \le u \le 0$ $\qquad$ $-1 \le v \le 1$

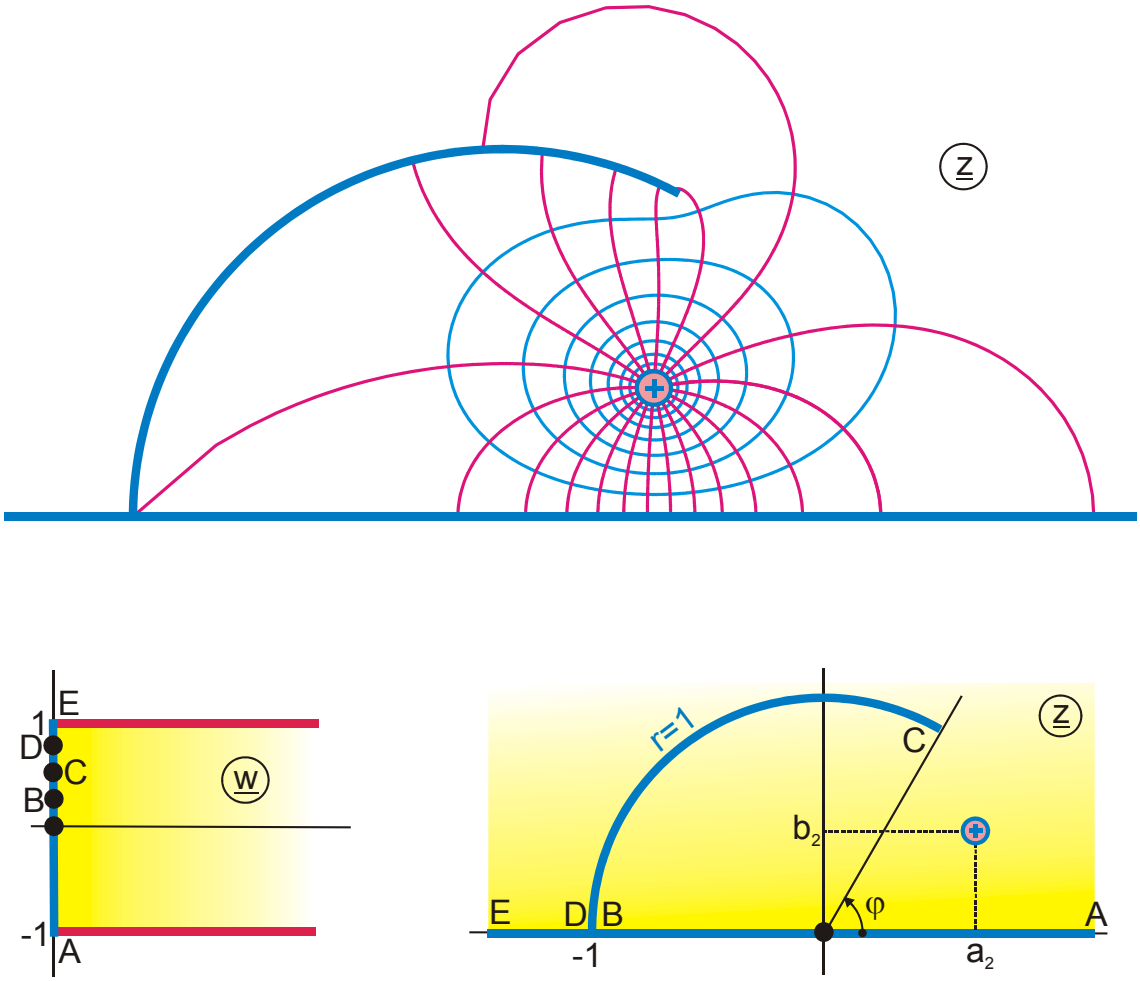


Abbildung K 1.7

$$z = \frac{w_3 - 1}{w_3 + 1}$$

gegeben: φ, a_2, b_2

$$w_3 = \sqrt{w_2^{\,2} - h}$$

$$w_2 = a + jbw_1$$

$$w_1 = \tanh\frac{w\pi}{2}$$

$$a + jb = \sqrt{h + z_1^{\,2}}$$

$$v_C = \frac{2}{\pi}\arctan\frac{a}{b}$$

$$h = 1/\tan^2(\varphi/2)$$

$$r = a_2 + jb_2$$

$$z_1 = \frac{1+r}{1-r}$$

$$0 \le u \le 0{,}8$$

$$-1 \le v \le 1$$

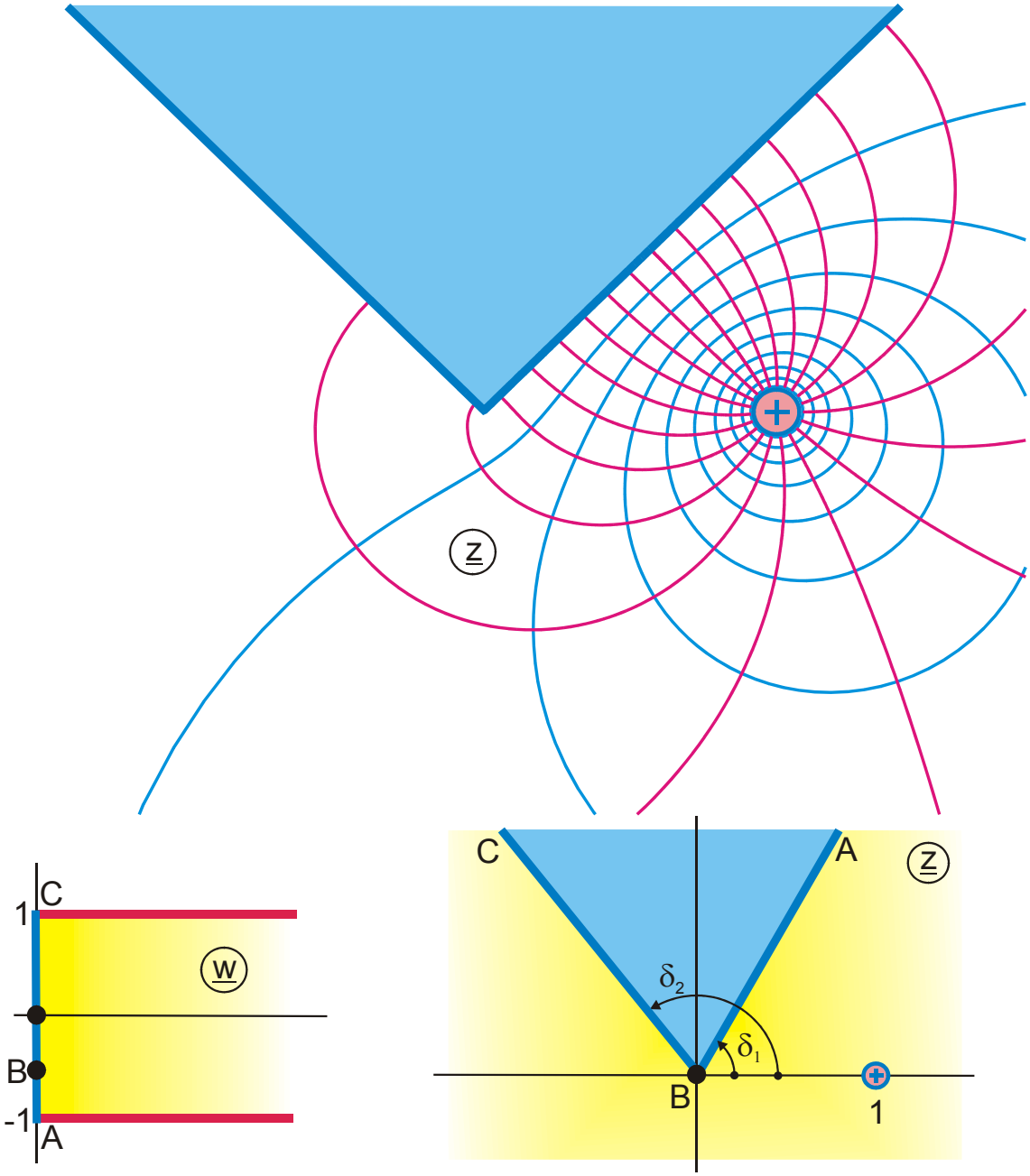


Abbildung K 1.8

$z = e^{j\delta_2}\ w_1^{(2-\delta_2/\pi+\delta_1/\pi)}$

$w_1 = a + jb\ \tanh(w\pi)$

$\varphi = \dfrac{2\pi - \delta_2}{2 - \delta_2/\pi + \delta_1/\pi}$

gegeben: $\delta_2 \geq \delta_1$

$a = \cos\varphi$ $\qquad$ $b = \sin\varphi$ $\qquad$ $v_B = \dfrac{2}{\pi}\arctan\dfrac{b}{a}$

$0 \leq u \leq 0{,}5$ $\qquad$ $-1 \leq v \leq 1$

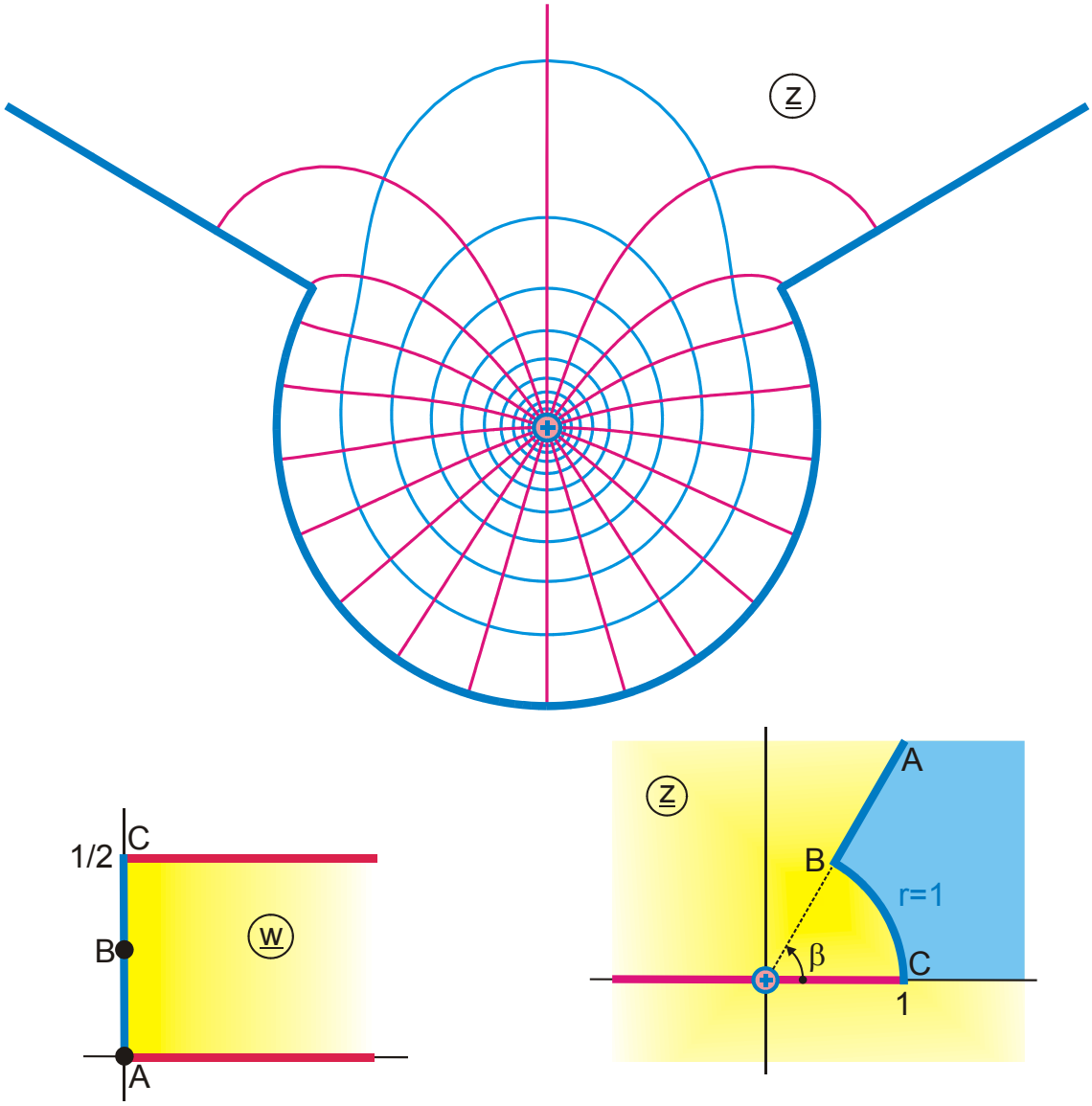


Abbildung K 1.9

$z = -\exp(-2w_2)$

$w_2 = \operatorname{ar\,cosh}\left(\frac{w_1}{a}\right) + b\,\operatorname{ar\,cosh}\left(\frac{w_1^2 c - a^2}{a^2(w_1^2 - 1)}\right)$

$v_B = \frac{1}{\pi}\arccos a$

$b = \frac{\sqrt{1-a^2}}{2}$

$0 \le u \le 1/2$

gegeben: β

$w_1 = \cosh(w\pi)$

$a = \sqrt{1-(1-\beta/\pi)^2}$

$c = 2 - a^2$

$0 \le v \le 1/2$

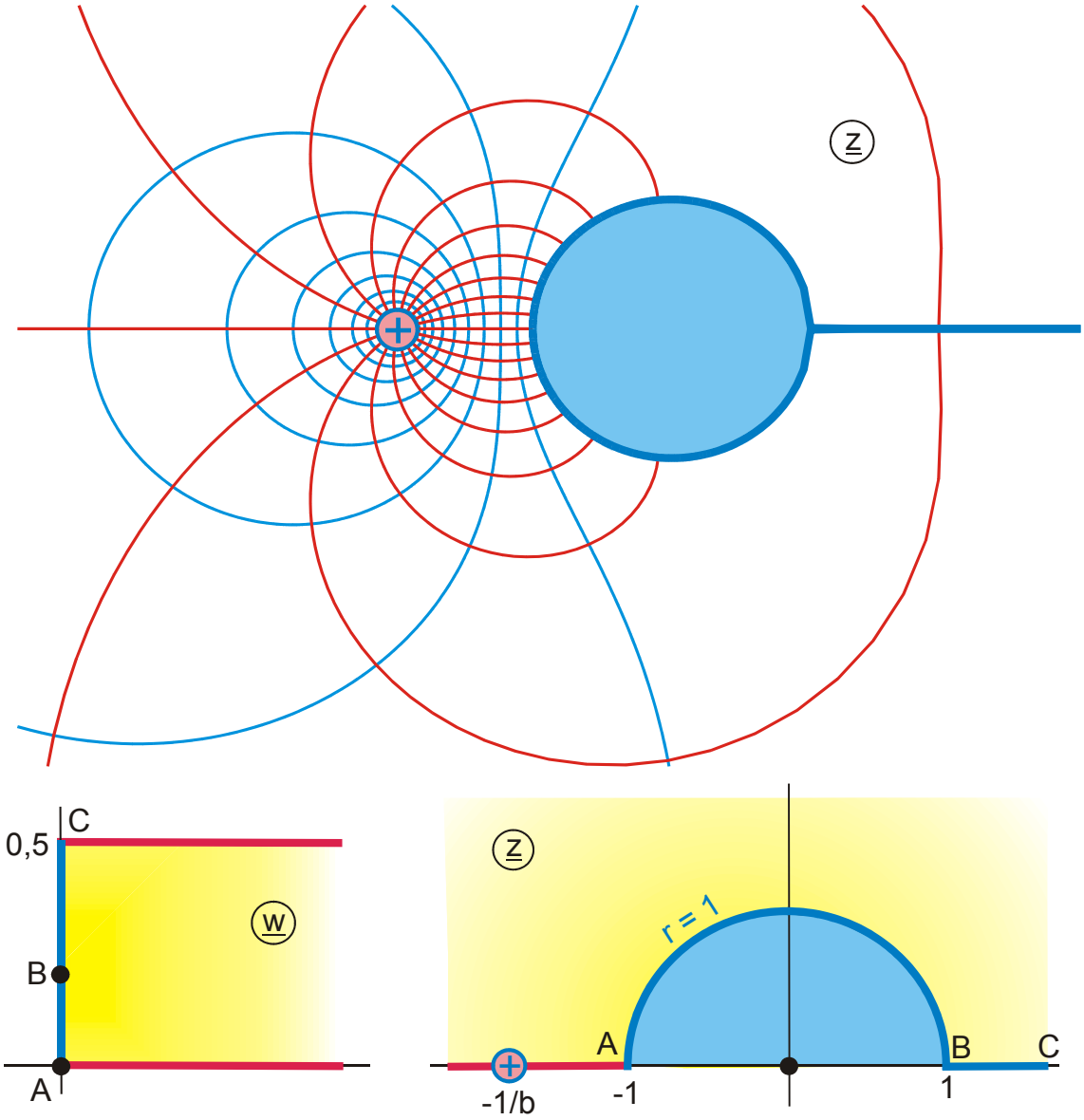


Abbildung K 1.10

$z = -w_2^{\,2}$

$w_1 = a \tanh(w\pi)$

$a = \dfrac{b-1}{2\sqrt{b}}$

$0 \le u \le 0{,}5$

$w_2 = w_1 - \sqrt{w_1^{\,2}+1}$

gegeben: b

$v_B = -\dfrac{1}{\pi}\arctan\dfrac{1}{a}$

$0 \le v \le 0{,}5$

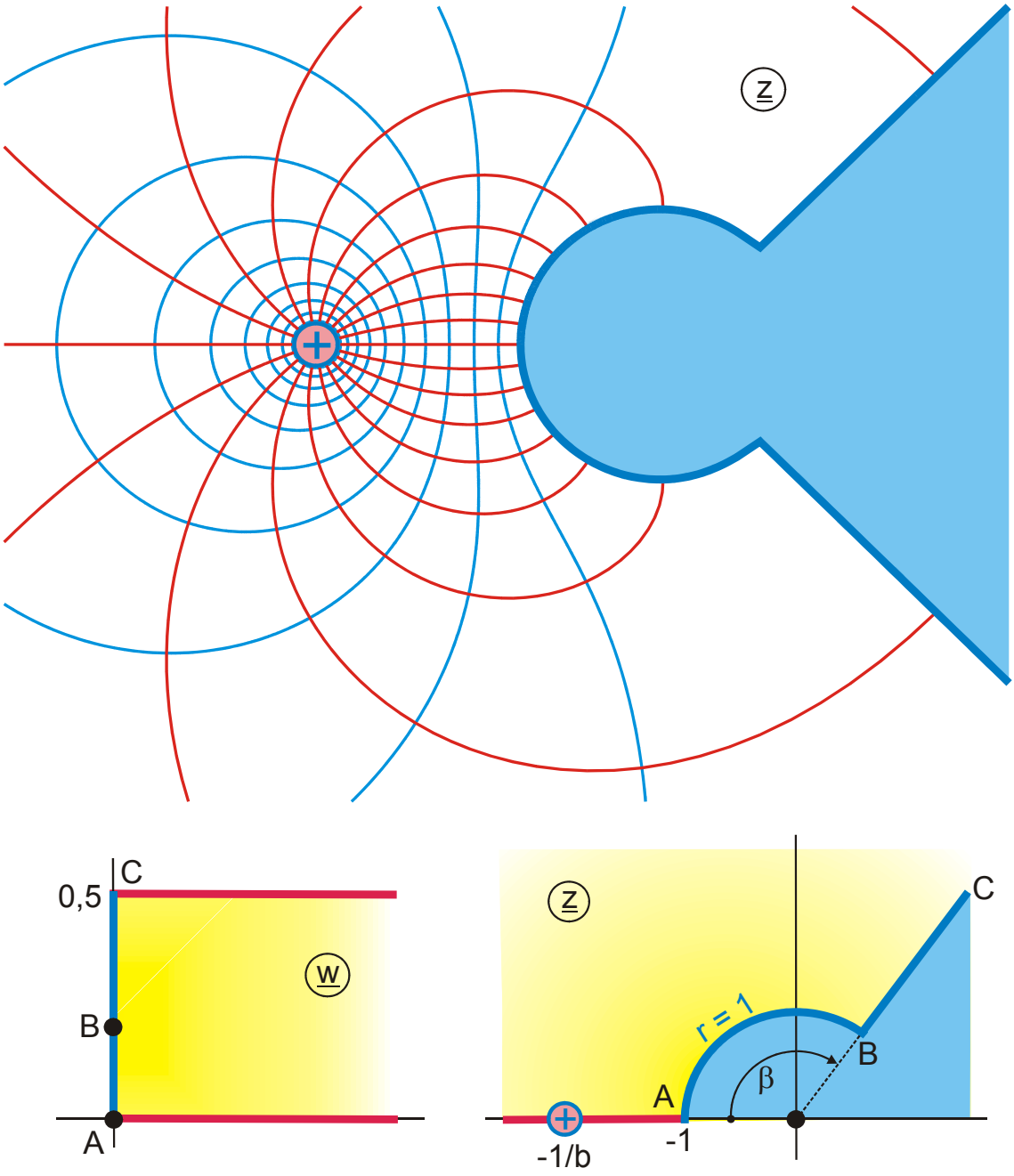


Abbildung K 1.11

$$z = -w_2^{\alpha}$$

$$w_1 = a \tanh(w\pi)$$

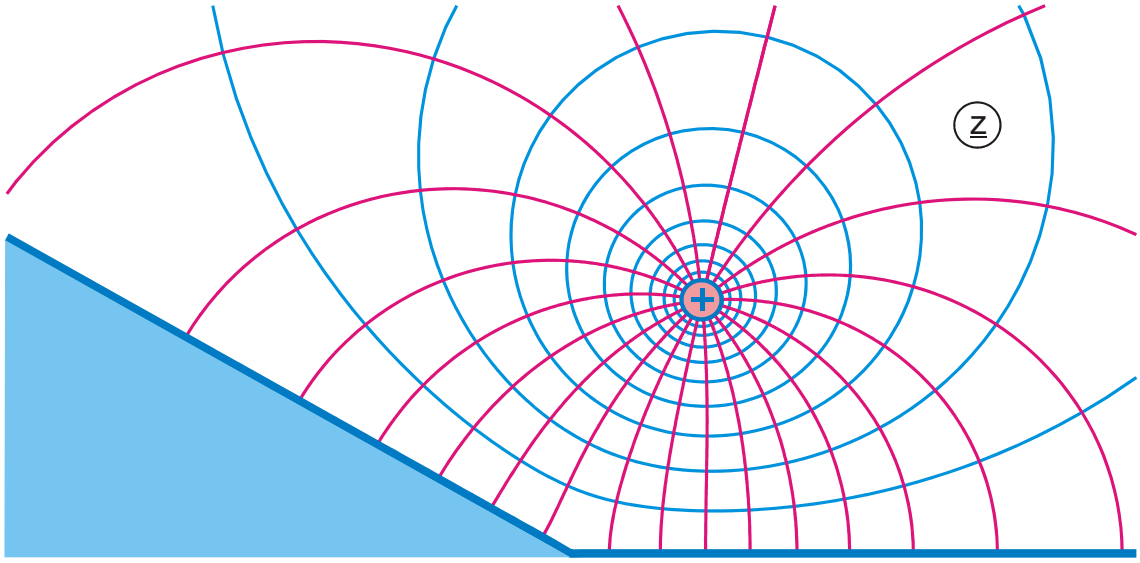
$$a = \frac{b^{2/\alpha} - 1}{2b^{1/\alpha}}$$

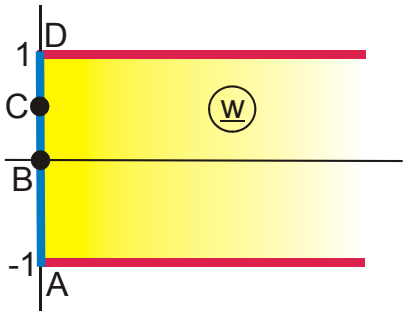
$$w_2 = w_1 - \sqrt{w_1^2 + 1}$$

$$\alpha = 2\beta / \pi$$

$$v_B = -\frac{1}{\pi} \arctan \frac{1}{a}$$

$0 \le u \le 0{,}5$ gegeben: b, β $0 \le v \le 0{,}5$





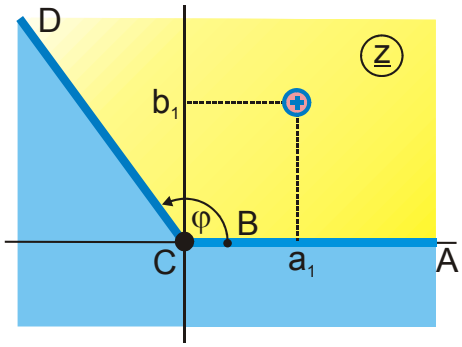


Abbildung K 1.12

$z = w_2^{\varphi/\pi}$

$w_2 = a + jbw_1$

$w_1 = \tanh\frac{w\pi}{2}$

$a + jb = (a_1 + jb_1)^{\pi/\varphi}$

$v_C = \frac{2}{\pi}\arctan\frac{a}{b}$

$b_1 \geq 0$

$0 \leq u \leq 1$

$-1 \leq v \leq 1$

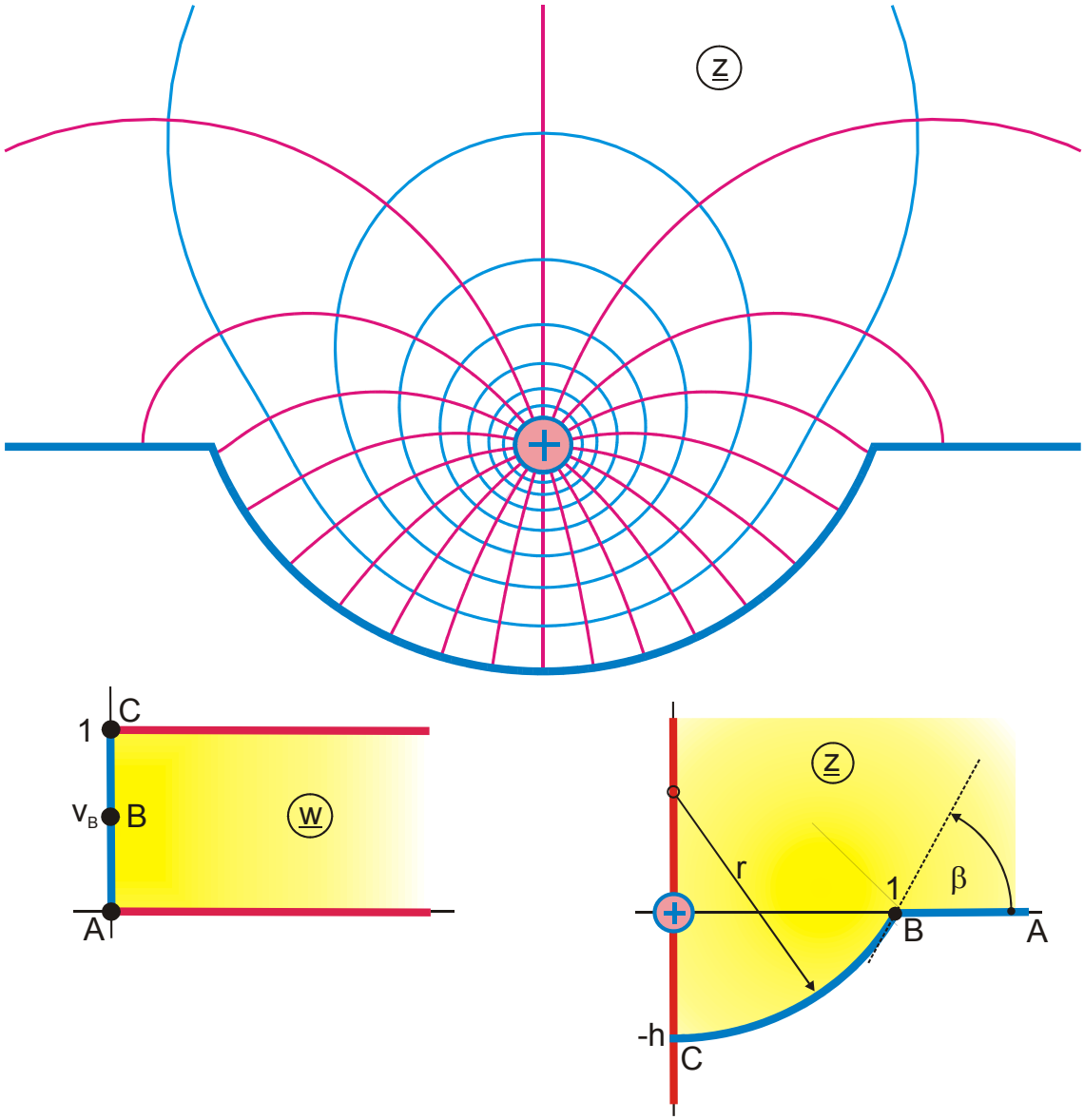


Abbildung K 1.13

$$z = \frac{1 + w_3}{1 - w_3}$$

$$w_3 = \left(\frac{w_2 + 1}{w_2 - 1} \right)^{\alpha}$$

$$w_2 = ja \frac{1 + w_1}{1 - w_1}$$

$$w_1 = \exp(w\pi)$$

$$a = 1/\tan[\pi/\{2\alpha\}]$$

$$\alpha = 1 + \beta/\pi$$

$$h = \tan(\beta/2)$$

$$r = \sin \beta$$

$$\beta = 75°$$

$$v_B = \frac{2}{\pi} \arctan a$$

$$0 \le u \le 0{,}8$$

$$0 \le v \le 1$$

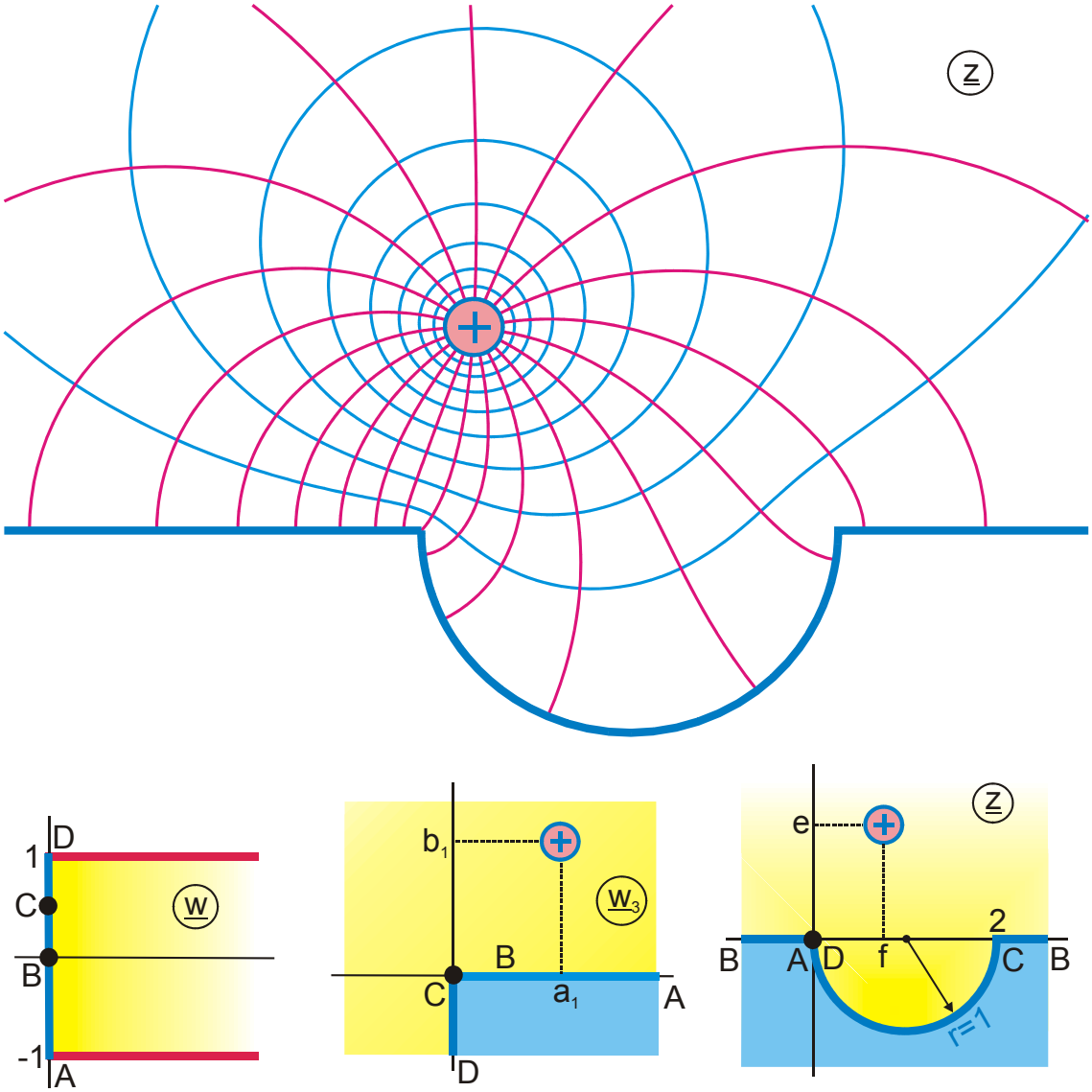


Abbildung K 1.14

$$z = -1/w_4 \qquad w_4 = w_3 - 0.5$$

$$w_3 = w_2^{3/2} \qquad w_2 = a + jbw_1$$

$$w_1 = \tanh\frac{w\pi}{2} \qquad a + jb = (a_1 + jb_1)^{2/3}$$

$$v_C = \frac{2}{\pi}\arctan\frac{a}{b} \qquad a_1 + jb_1 = -\frac{1}{f + je} + 0{,}5$$

$$0 \le u \le 1 \qquad -1 \le v \le 1$$

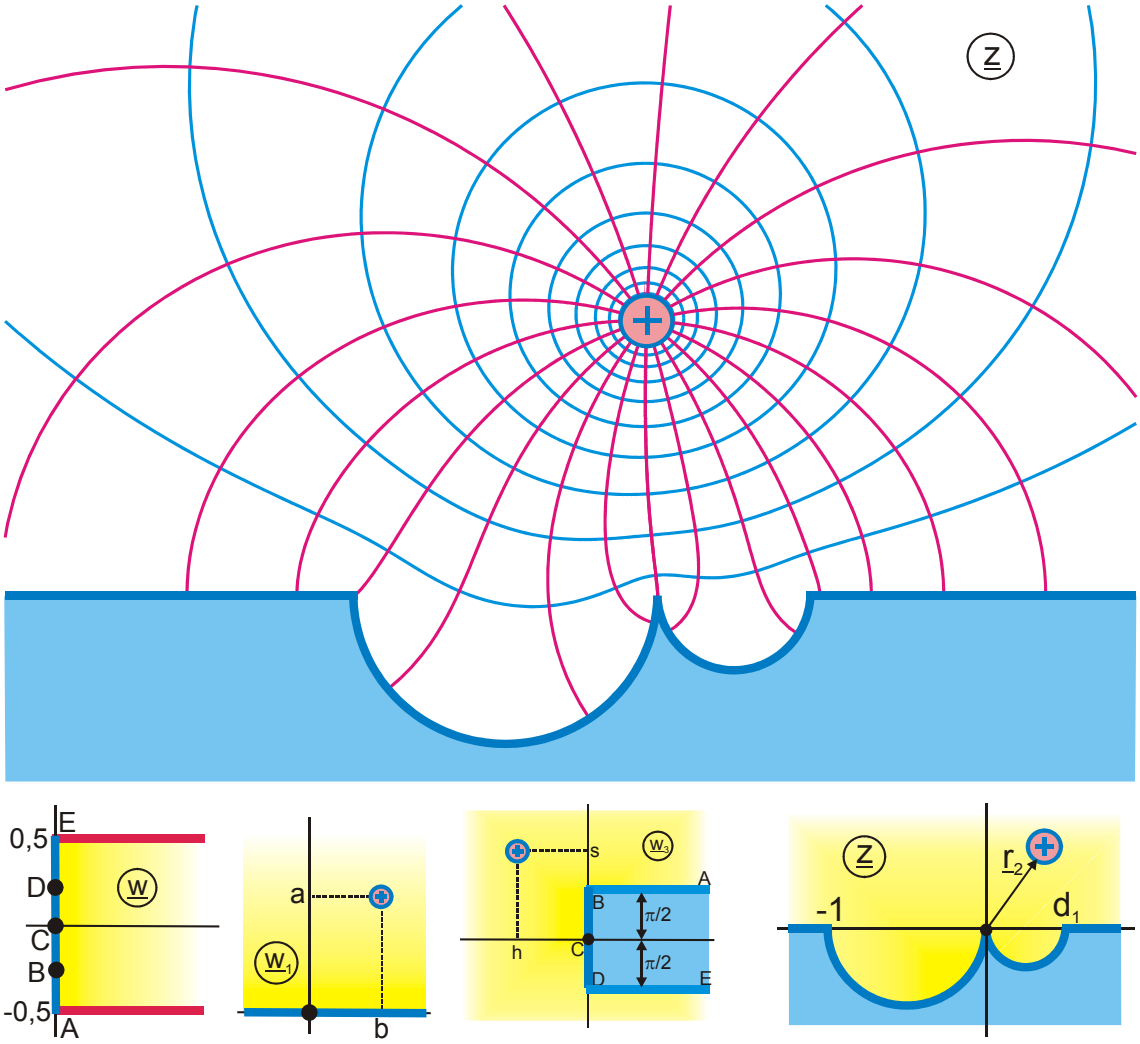


Abbildung K 1.15

$$z = \frac{\exp(-j\pi/2)}{(w_2 + je\pi/2)d_2}$$

$$w_3 = w_2 + j\frac{\pi}{2}$$

$$w_2 = w_1\sqrt{w_1^2 - 1} - \ln\left(w_1 + \sqrt{w_1^2 - 1}\right)$$

$$w_1 = ja\tanh(w\pi) + b$$

gegeben: a, b, d_1

$$r = b + ja$$

$$h + js = r\sqrt{r^2 - 1} - \ln\left(r + \sqrt{r^2 - 1}\right) + j\frac{\pi}{2}$$

$$v_D = \frac{1}{\pi}\arctan\frac{b-1}{a}$$

$$e = \frac{2d_1}{1 + d_1}$$

$$d_2 = \frac{2}{\pi e}$$

$$\underline{r}_1 = h + j(s - \pi[1 - e]/2)$$

$$\underline{r}_2 = \frac{1}{j\underline{r}_1 d_2}$$

$0 \le u \le 0{,}5$

$-0{,}5 \le v \le 0{,}5$

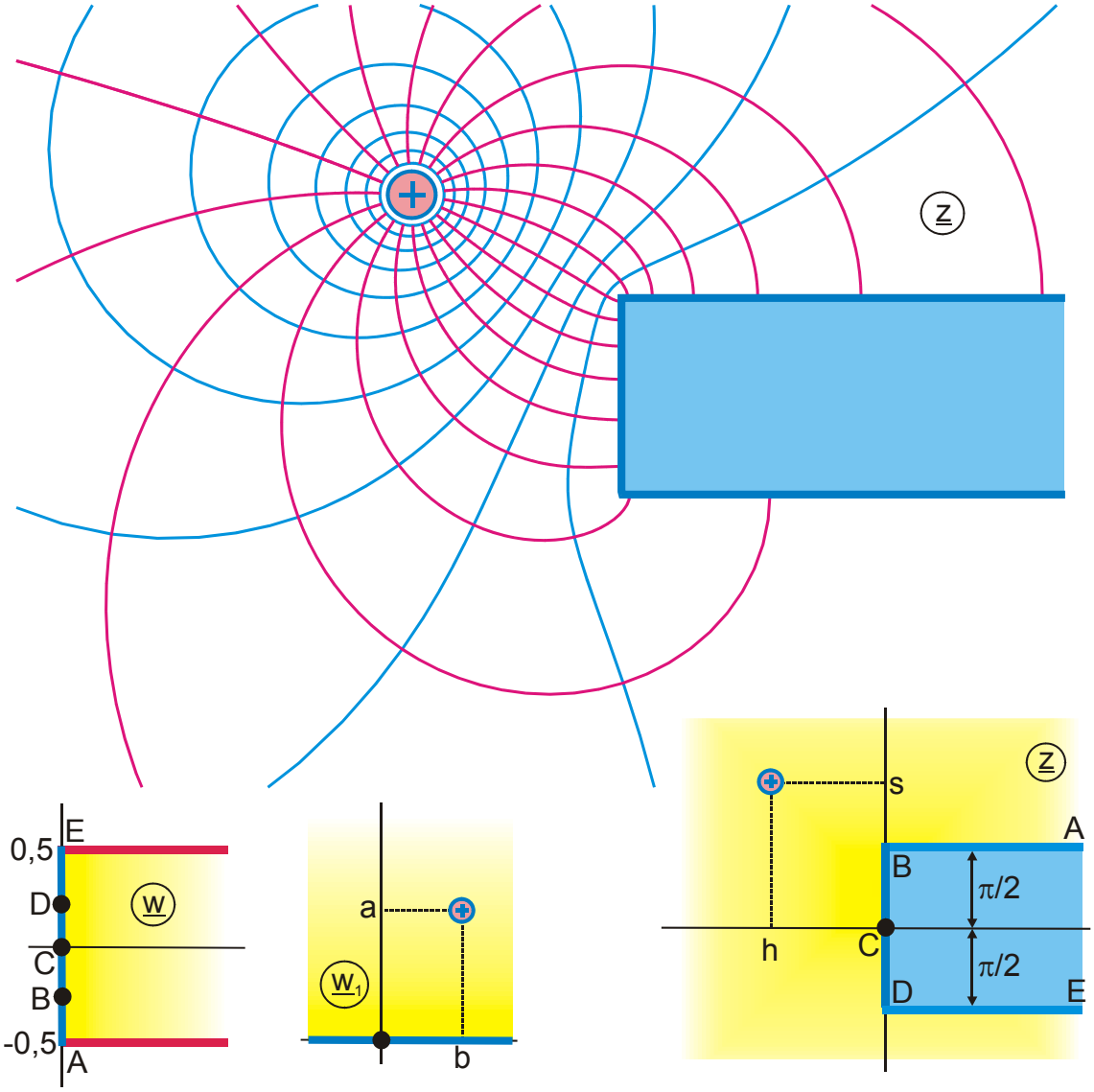


Abbildung K 2

$$z = w_2 + j\frac{\pi}{2}$$

$$w_1 = ja\tanh(w\pi) + b$$

$$r = b + ja$$

$$v_D = \frac{1}{\pi}\arctan\frac{b-1}{a}$$

$$0 \le u \le 0{,}5$$

$$w_2 = w_1\sqrt{w_1^2 - 1} - \ln\left(w_1 + \sqrt{w_1^2 - 1}\right)$$

gegeben: a, b

$$h + js = r\sqrt{r^2 - 1} - \ln\left(r + \sqrt{r^2 - 1}\right) + j\frac{\pi}{2}$$

$$-0{,}5 \le v \le 0{,}5$$

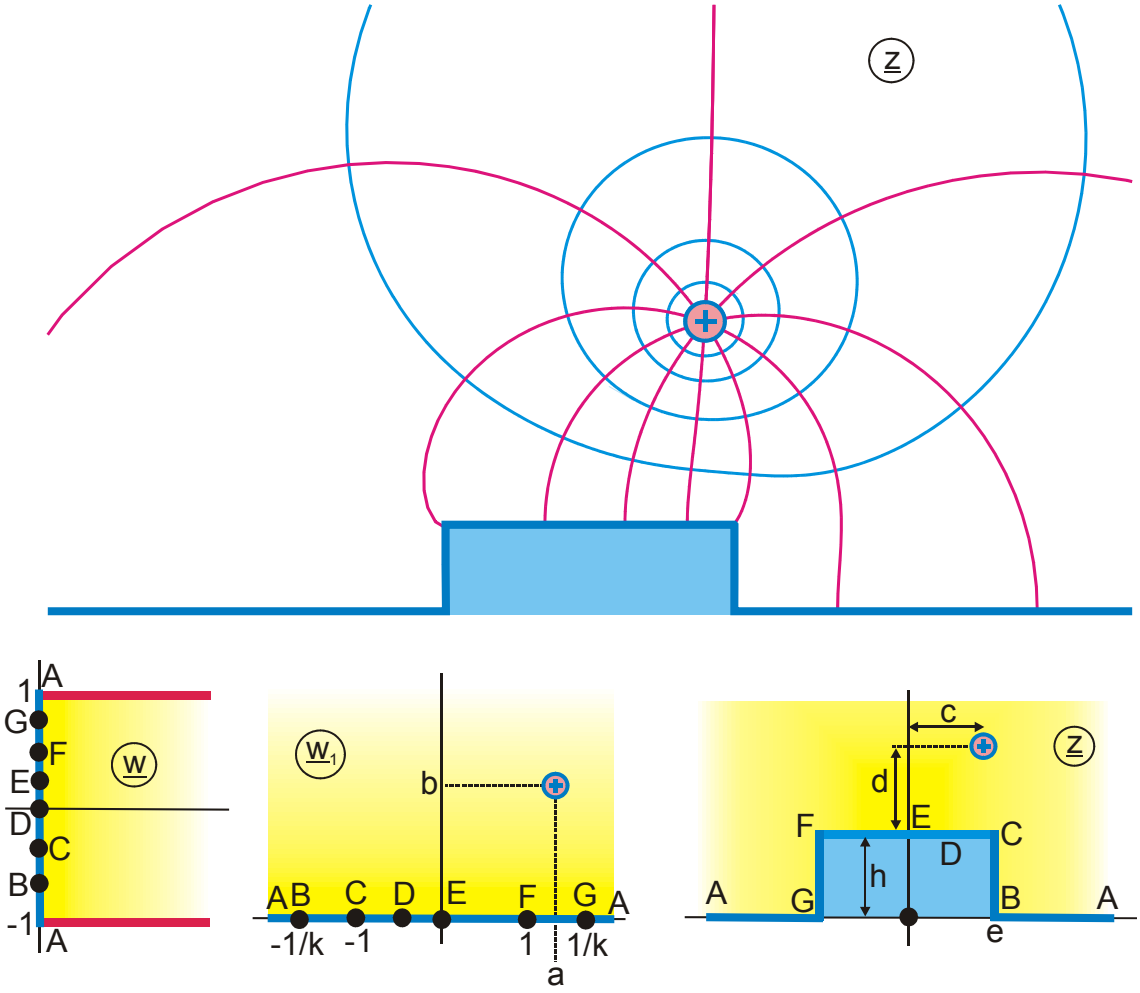


Abbildung K 2.1

$z = B_a(w_1,k) + jh$

$w_1 = ja\tanh\left(\frac{w\pi}{2}\right) + b$

$h = \frac{E'}{k^2} - K'$

$e = \frac{E - k'^2 K}{k^2}$

$c + jd = B_a(a + jb, k)$

$v_B = \frac{2}{\pi}\arctan\frac{a - 1/k}{b}$

$v_C = \frac{2}{\pi}\arctan\frac{a-1}{b}$

$v_E = \frac{2}{\pi}\arctan\frac{a}{b}$

$v_F = \frac{2}{\pi}\arctan\frac{a+1}{b}$

$v_G = \frac{2}{\pi}\arctan\frac{a + 1/k}{b}$

$-1 \le v \le 1$

$0 \le u \le 1$

gegeben: a, b, k

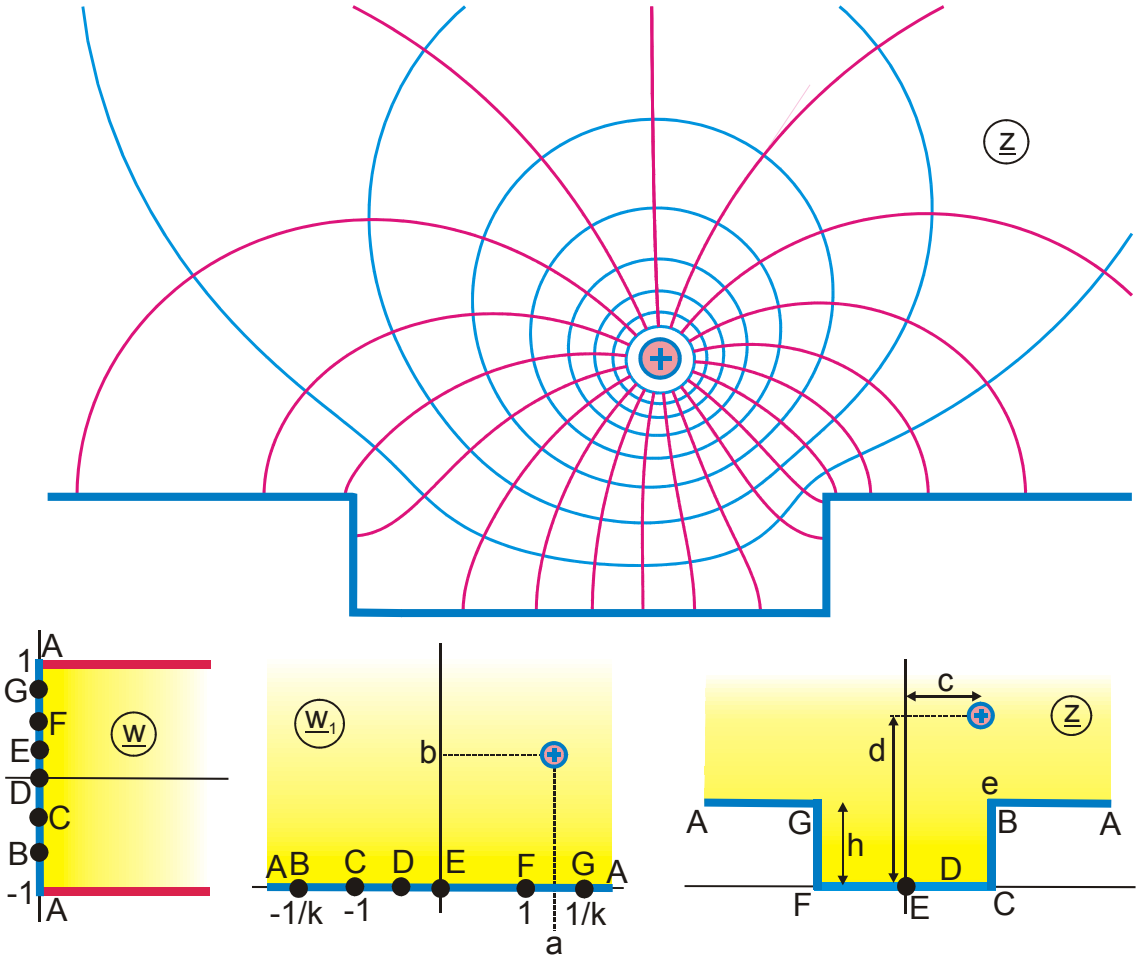


Abbildung K 2.2

$z = E_a(w_1,k)$

$w_1 = ja\tanh\left(\frac{w\pi}{2}\right) + b$

$h = K'(k) - E'(k)$

$e = E(k)$

$c + jd = E_a(a + jb,k)$

$v_B = \frac{2}{\pi}\arctan\frac{a-1/k}{b}$

$v_C = \frac{2}{\pi}\arctan\frac{a-1}{b}$

$v_E = \frac{2}{\pi}\arctan\frac{a}{b}$

$v_F = \frac{2}{\pi}\arctan\frac{a+1}{b}$

$v_G = \frac{2}{\pi}\arctan\frac{a+1/k}{b}$

$-1 \le v \le 1$

$0 \le u \le 0{,}8$

gegeben: a, b, k

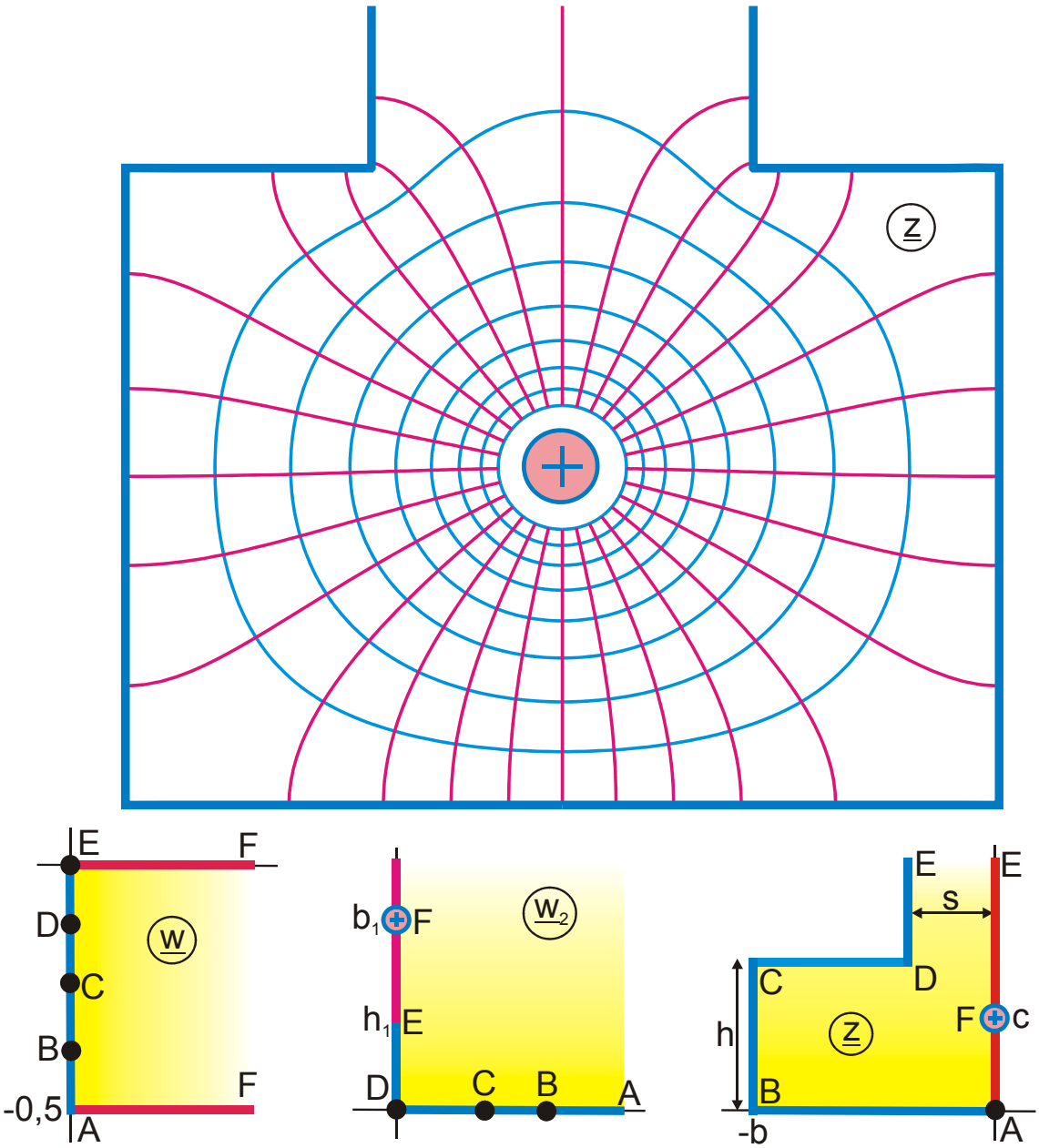


Abbildung K 2.3

$$z = j\left[h - \Pi_e\left(w_3, k', a\right)\right] - b$$

$$w_3 = j\left[K(k) - F_a\left(w_2, k\right)\right]$$

$$w_2 = j\sqrt{w_1^{\,2} + h_1^{\,2}}$$

$$w_1 = b_2 \tanh(w\pi)$$

$$b_2 = \sqrt{b_1^{\,2} - h_1^{\,2}}$$

$$a = \operatorname{Im} F_a\left(jh_1, k\right)$$

$$f_1 = \operatorname{Im} F_a\left(jb_1, k\right)$$

$$s = \frac{c\pi}{2}$$

$$c = \frac{sn(a,k')}{cn(a,k')\,dn(a,k')}$$

$$-0{,}5 \le v \le 0$$

$$0 \le u \le 0{,}3$$

$$b = K(k) + c\left[K(k)Z_e(a,k') + \frac{\pi a}{2K'(k)}\right]$$

gegeben: h_1, b_1, k

$$h = K'(k)\left[1 + cZ_e(a,k')\right]$$

$$f = \operatorname{Re}\Pi_e\left\{f_1 + jK(k), k', a\right\}$$

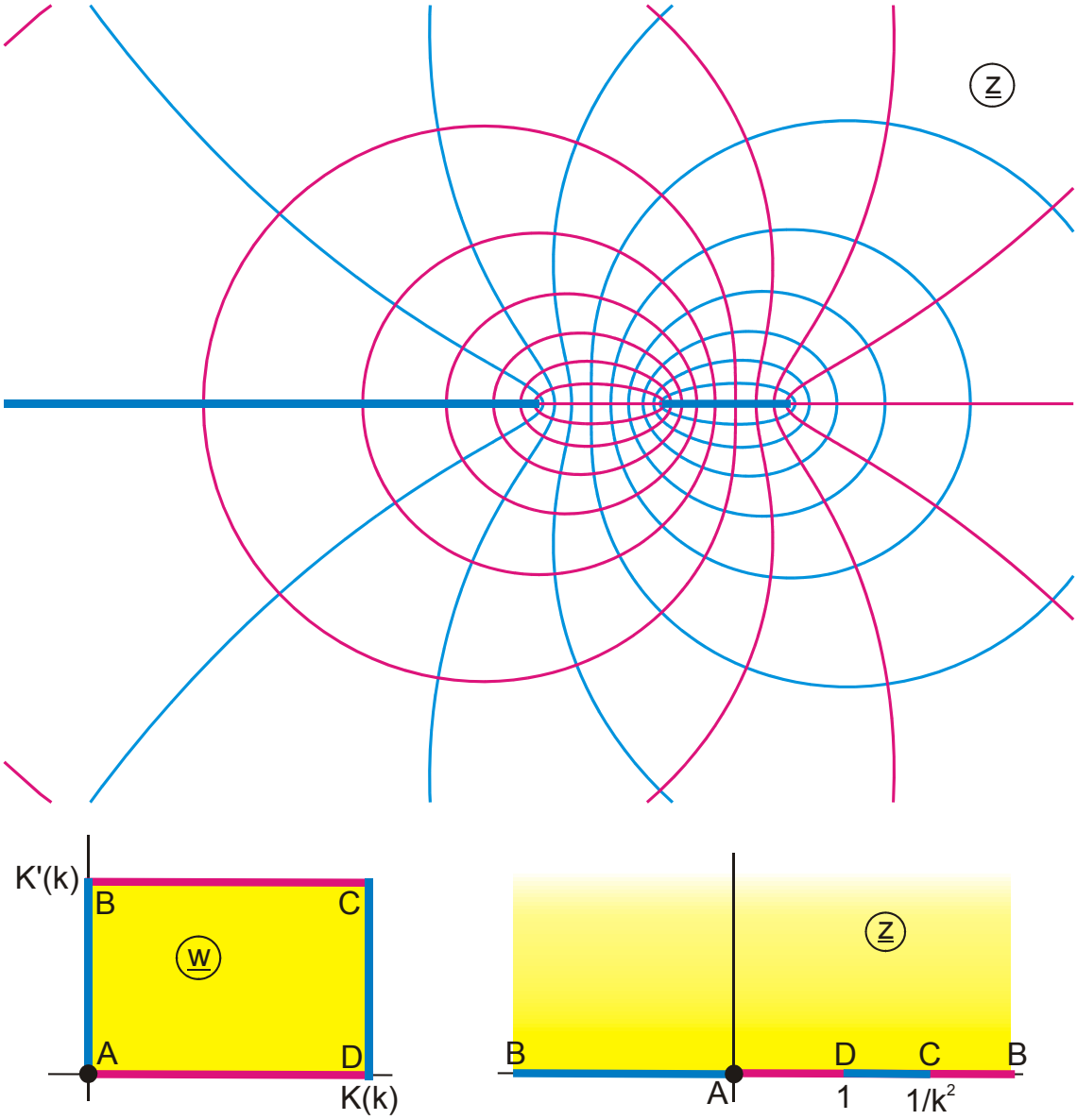


Abbildung K 3

$z = \mathrm{sn}^2\left(w, k\right)$

$0 \le \mathrm{v} \le \mathrm{K'(k)}$ $\qquad$ $0 \le \mathrm{u} \le \mathrm{K(k)}$

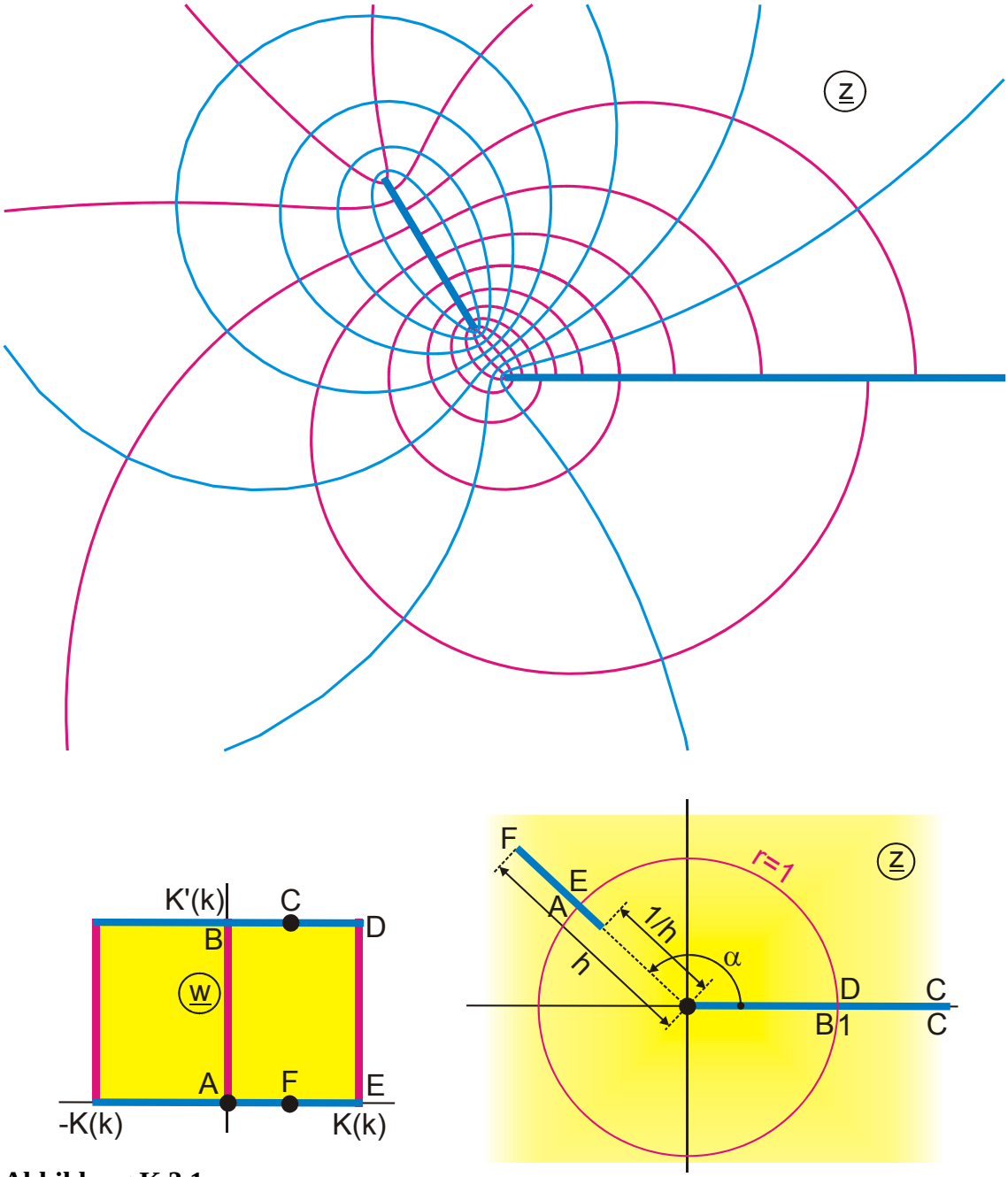


Abbildung K 3.1

$$z = \left\{ \frac{\vartheta_4\left[\frac{\pi}{2K(k)}(w+a),\tau\right]}{\vartheta_4\left[\frac{\pi}{2K(k)}(w-a),\tau\right]} \right\}^2 e^{j\alpha}$$

$$h = \left\{ \frac{\mathrm{Re}\,\vartheta_4\left[\frac{\pi}{2K(k)}(u_F+a),\tau\right]}{\mathrm{Re}\,\vartheta_4\left[\frac{\pi}{2K(k)}(u_F-a),\tau\right]} \right\}^2$$

$$\sigma = \frac{Z_e(a,k)}{k^2\,\mathrm{sn}(a,k)\left[\mathrm{cn}(a,k)\,\mathrm{dn}(a,k)+\mathrm{sn}(a,k)\,Z_e(a,k)\right]}$$

$$a = \frac{\alpha\,K(k)}{2\pi}$$

$$\tau = \frac{K(k)}{K'(k)}$$

$$u_F = F_a\left(\sqrt{\sigma},k\right)$$

$$-K(k) \le u \le K(k)$$

$$0 \le v \le K'(k)$$

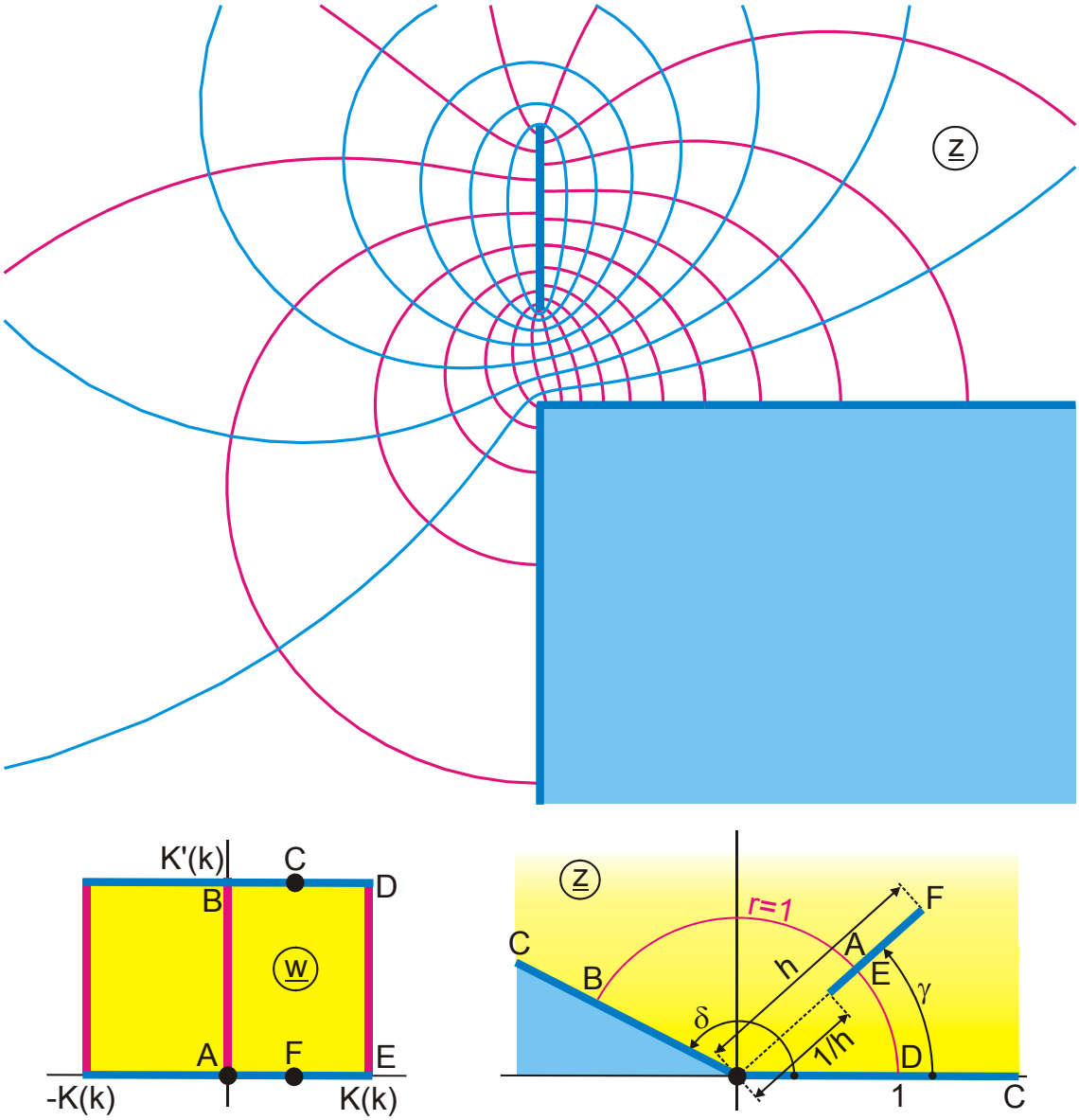


Abbildung K 3.2

$$z = e^{j\alpha\beta} w_1^{\beta}$$

gegeben: δ, γ, k

$$w_1 = \frac{\vartheta_4\left[\frac{\pi}{2K(k)}(w+a),\tau\right]}{\vartheta_4\left[\frac{\pi}{2K(k)}(w-a),\tau\right]}$$

$$h = \left\{\frac{\operatorname{Re}\vartheta_4\left[\frac{\pi}{2K(k)}(u_F+a),\tau\right]}{\operatorname{Re}\vartheta_4\left[\frac{\pi}{2K(k)}(u_F-a),\tau\right]}\right\}^{\beta}$$

$$\sigma = \frac{Z_e(a,k)}{k^2\,sn(a,k)\left[cn(a,k)\,dn(a,k)+sn(a,k)\,Z_e(a,k)\right]} \qquad a = \frac{\alpha\,K(k)}{\pi}$$

$$\tau = \frac{K(k)}{K'(k)} \qquad \beta = \delta/\pi \qquad u_F = F_a\left(\sqrt{\sigma},k\right)$$

$$-K(k) \le u \le K(k) \qquad 0 \le v \le K'(k) \qquad \alpha = \gamma/\beta$$

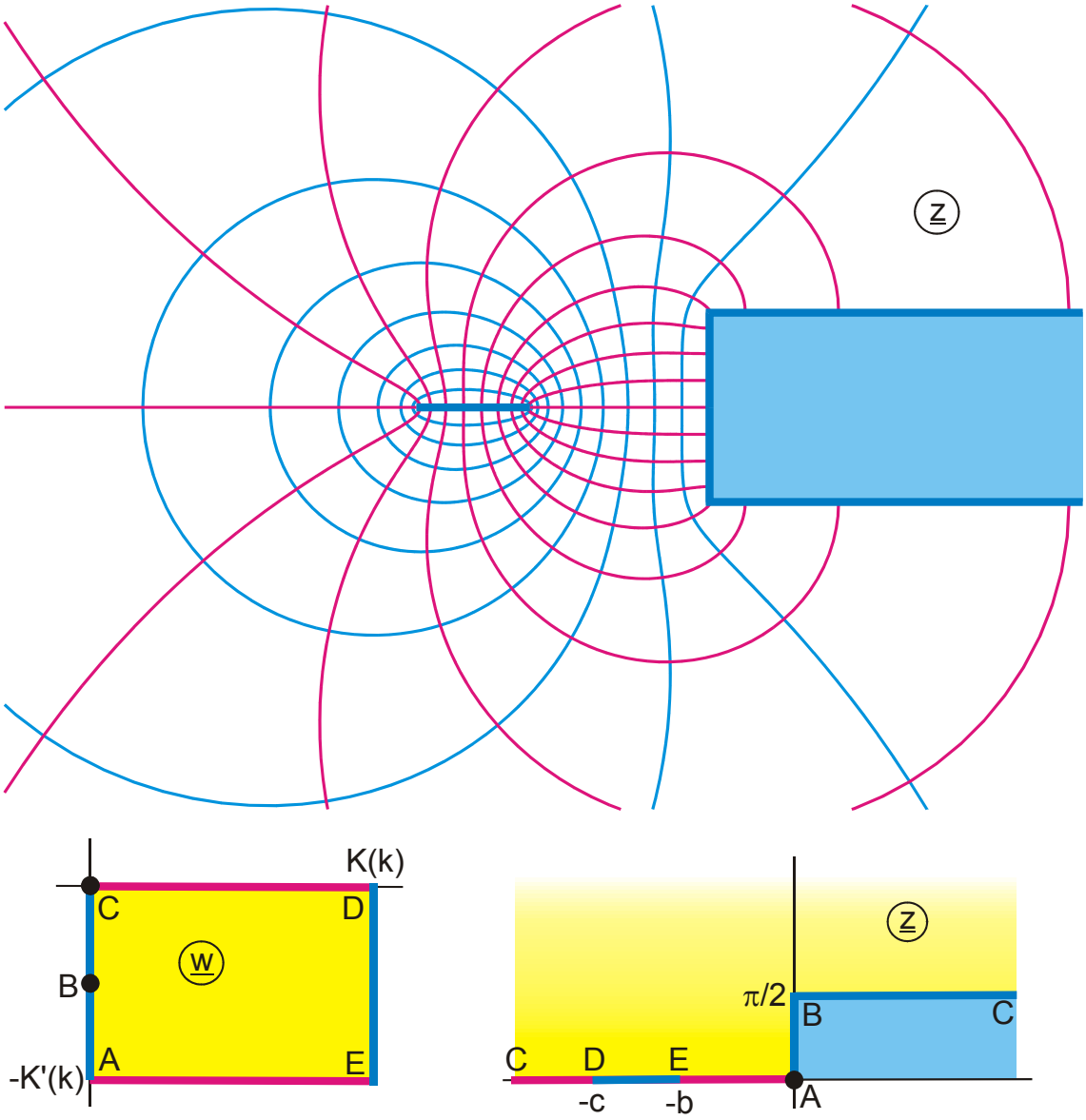


Abbildung K 3.3

$$z = w_1\sqrt{w_1^2 - 1} - \ln\left(w_1 + \sqrt{w_1^2 - 1}\right) + j\pi/2 \qquad w_1 = \mathrm{ja\,sn}(w,k)$$

$$b = a\sqrt{a^2 + 1} + \ln\left(a + \sqrt{a^2 + 1}\right) \qquad v_B = F_a\left(j/a, k\right)$$

$$c = \frac{a}{k}\sqrt{\left(\frac{a}{k}\right)^2 + 1} + \ln\left(\frac{a}{k} + \sqrt{\left(\frac{a}{k}\right)^2 + 1}\right)$$

$$0 \le u \le K(k) \qquad -K'(k) \le v \le 0$$

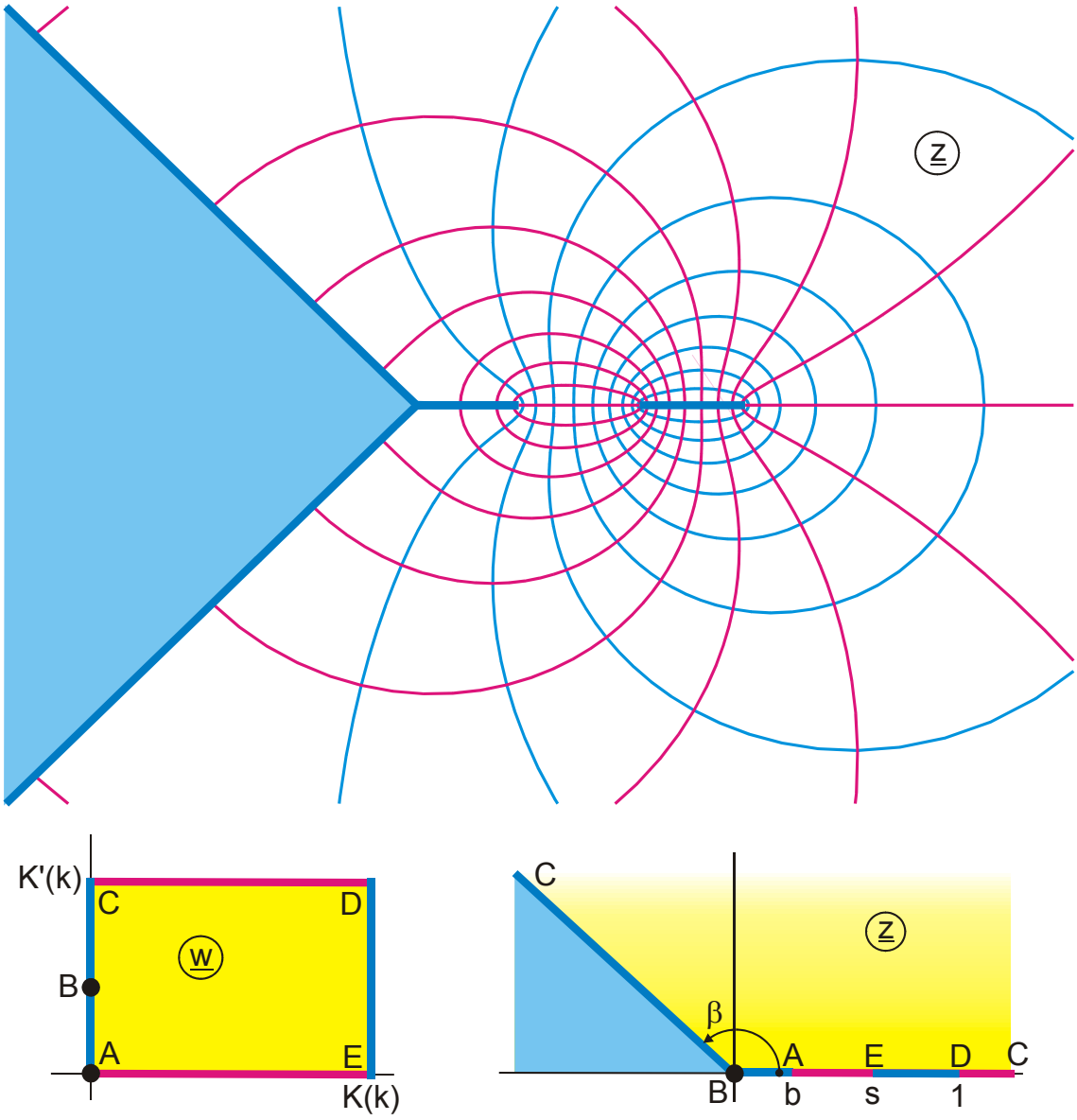


Abbildung K 3.4

$$z = \left(\frac{w_1^{\,2} + h}{1/k^2 + h} \right)^{\beta/\pi} \qquad w_1 = \mathrm{sn}^2(w,k)$$

$$s = \left(\frac{1+h}{1/k^2 + h} \right)^{\beta/\pi} \qquad h = \frac{b^{\pi/\beta}}{k^2\left(1 - b^{\pi/\beta}\right)}$$

$$v_B = \mathrm{Im}\left\{ F_k\left(j\sqrt{h}, k \right) \right\}$$

$$0 \le u \le K(k) \qquad 0 \le v \le K'(k)$$

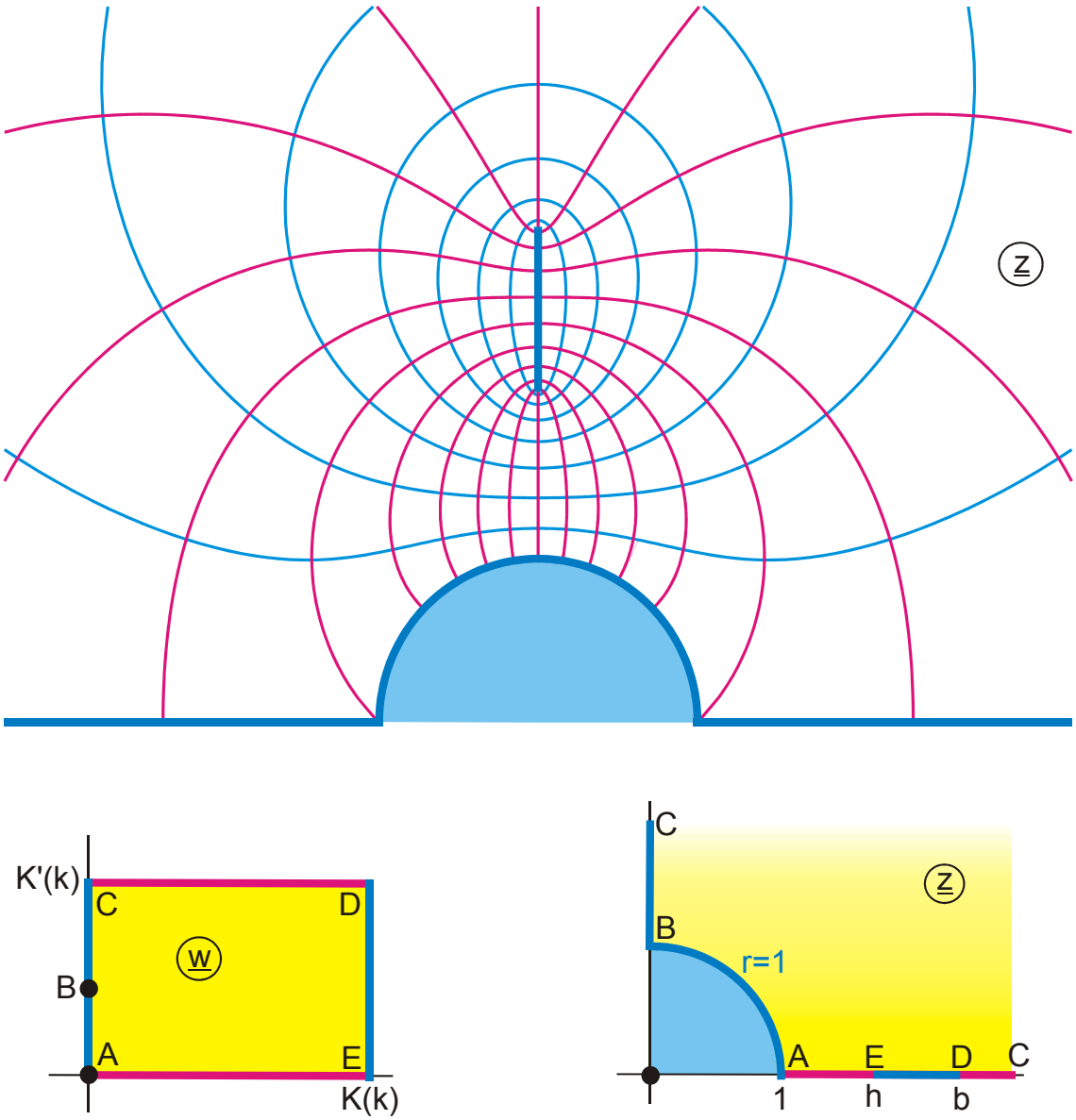


Abbildung K 3.5

$$z = w_1 + \sqrt{w_1^2 + 1} \qquad w_1 = a\,\mathrm{sn}^2(w,k)$$

$$a = \frac{h - 1/h}{2} \qquad k = \frac{2a}{b - 1/b}$$

$$v_B = \mathrm{Im}\left\{F_a\left(j/a, k\right)\right\}$$

$$0 \le u \le K(k) \qquad 0 \le v \le K'(k)$$

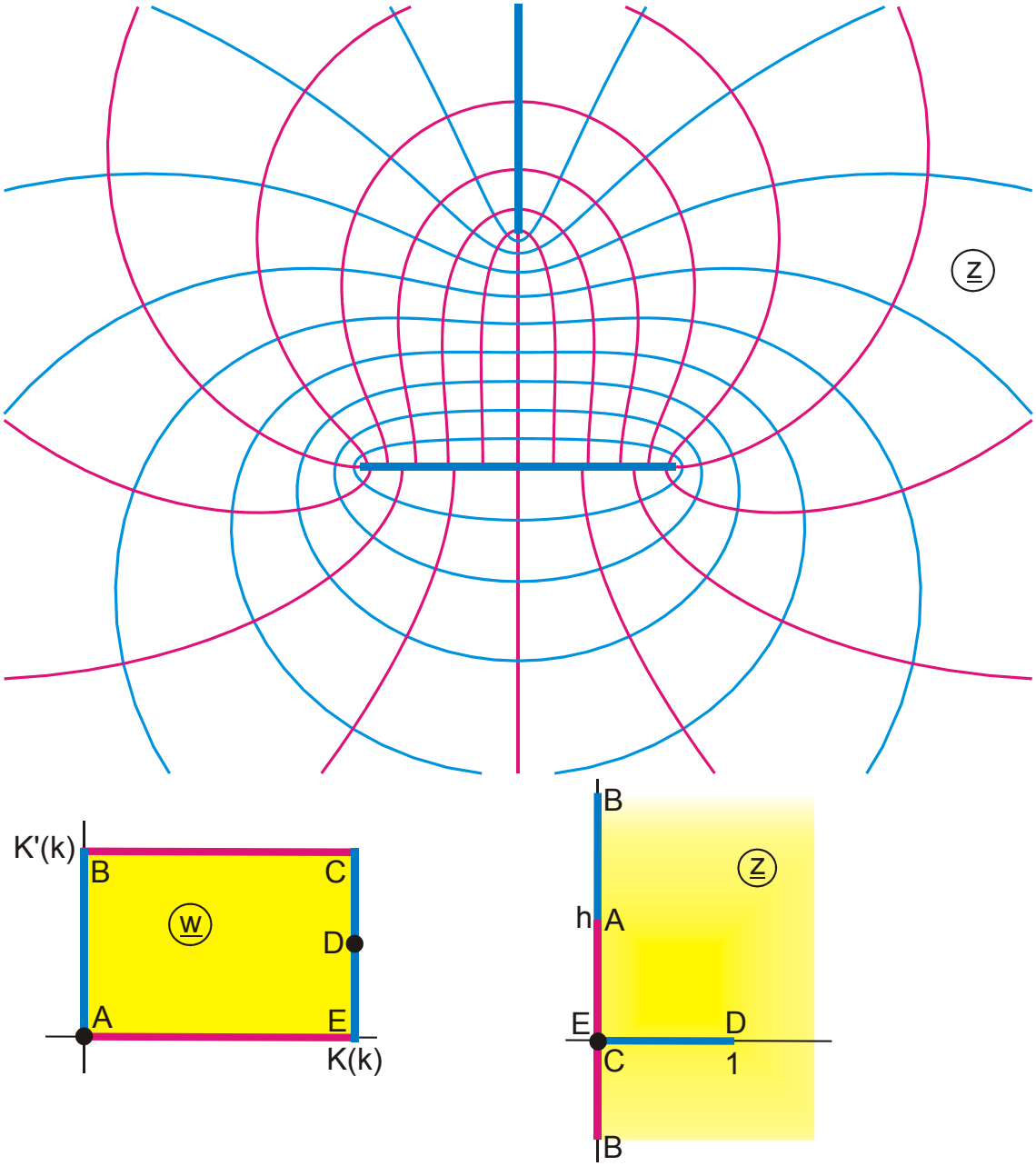


Abbildung K 3.6

$$z = \sqrt{w_2^{\,2} + 1} \qquad w_2 = -j\frac{w_1 - a}{b}$$

$$w_1 = \mathrm{sn}^2(w,k) \qquad b = \frac{1}{h^2}\left(1 + \sqrt{1 + h^2}\right)$$

$$k = \frac{1}{\sqrt{2b + 1}} \qquad a = \frac{1}{2}\left(\frac{1}{k^2} + 1\right)$$

$$0 \le u \le K(k) \qquad 0 \le v \le K'(k)$$

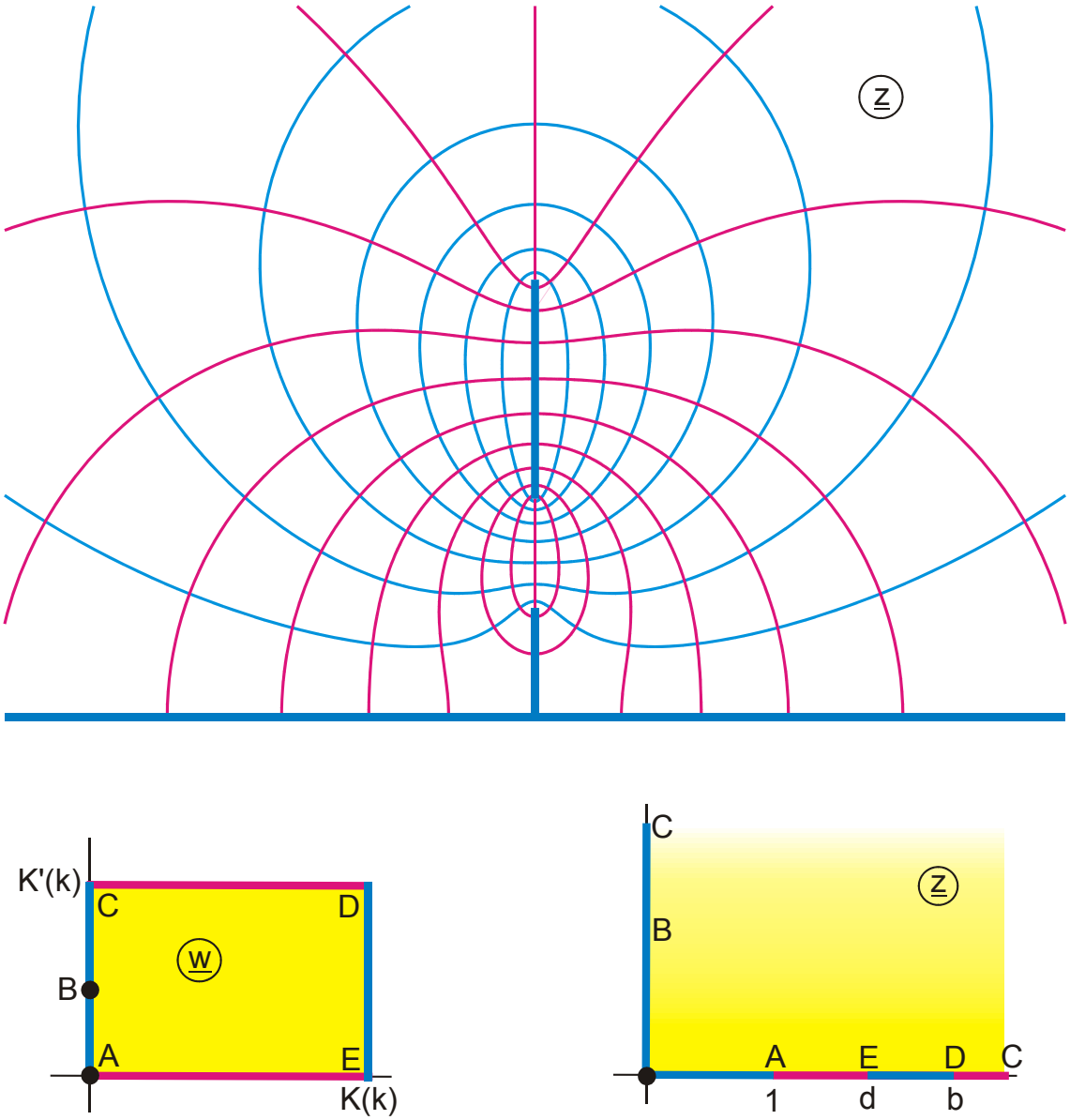


Abbildung K 3.7

$$z = \sqrt{1 + a\,\mathrm{sn}^2\left(w, k\right)}$$

$$k = \sqrt{\frac{a}{b^2 - 1}} \qquad a = d^2 - 1$$

$$0 \le u \le K(k) \qquad 0 \le v \le K'(k)$$

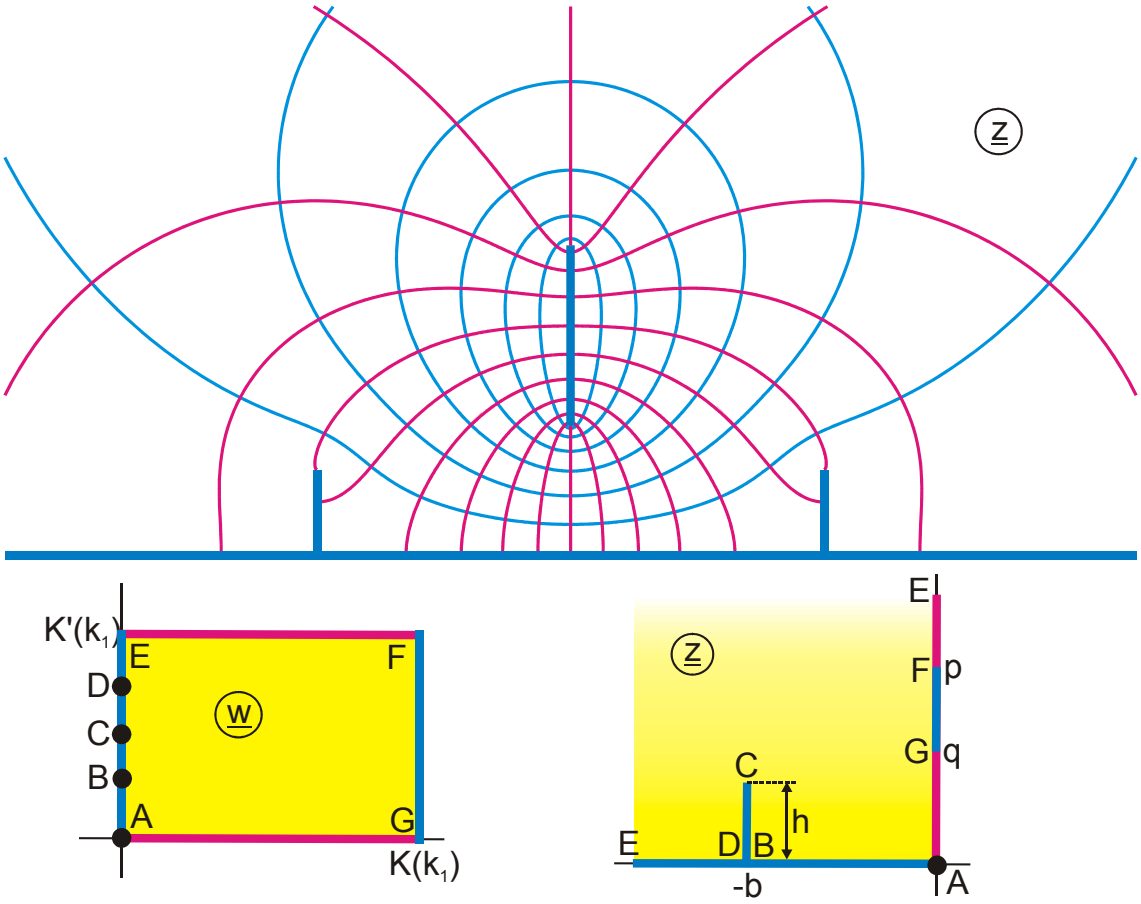


Abbildung K 3.8

$$z = Z_e(w_2,k) + \frac{\pi}{2K(k)K'(k)} w_2 \qquad w_2 = F_a(w_1,k)$$

$$w_1 = jd\,sn(w,k_1) \qquad \text{gegeben: } k,\ k_1,\ d$$

$$p = Z_e\left[F_a(jd,k),k\right] + \frac{\pi}{2K(k)K'(k)} F_a(jd,k) \qquad b = \frac{\pi}{2K(k)}$$

$$h = E_a(t,k') - \frac{E'(k)}{K'(k)} F_a(t,k') \qquad t = \frac{1}{k'}\sqrt{1-\frac{E'(k)}{K'(k)}}$$

$$q = Z_e\left[F_a(jd/k_1,k),k\right] + \frac{\pi}{2K(k)K'(k)} F_a(jd/k_1,k)$$

$0 \le u \le K(k_1)$ $\qquad 0 \le v \le K'(k_1)$

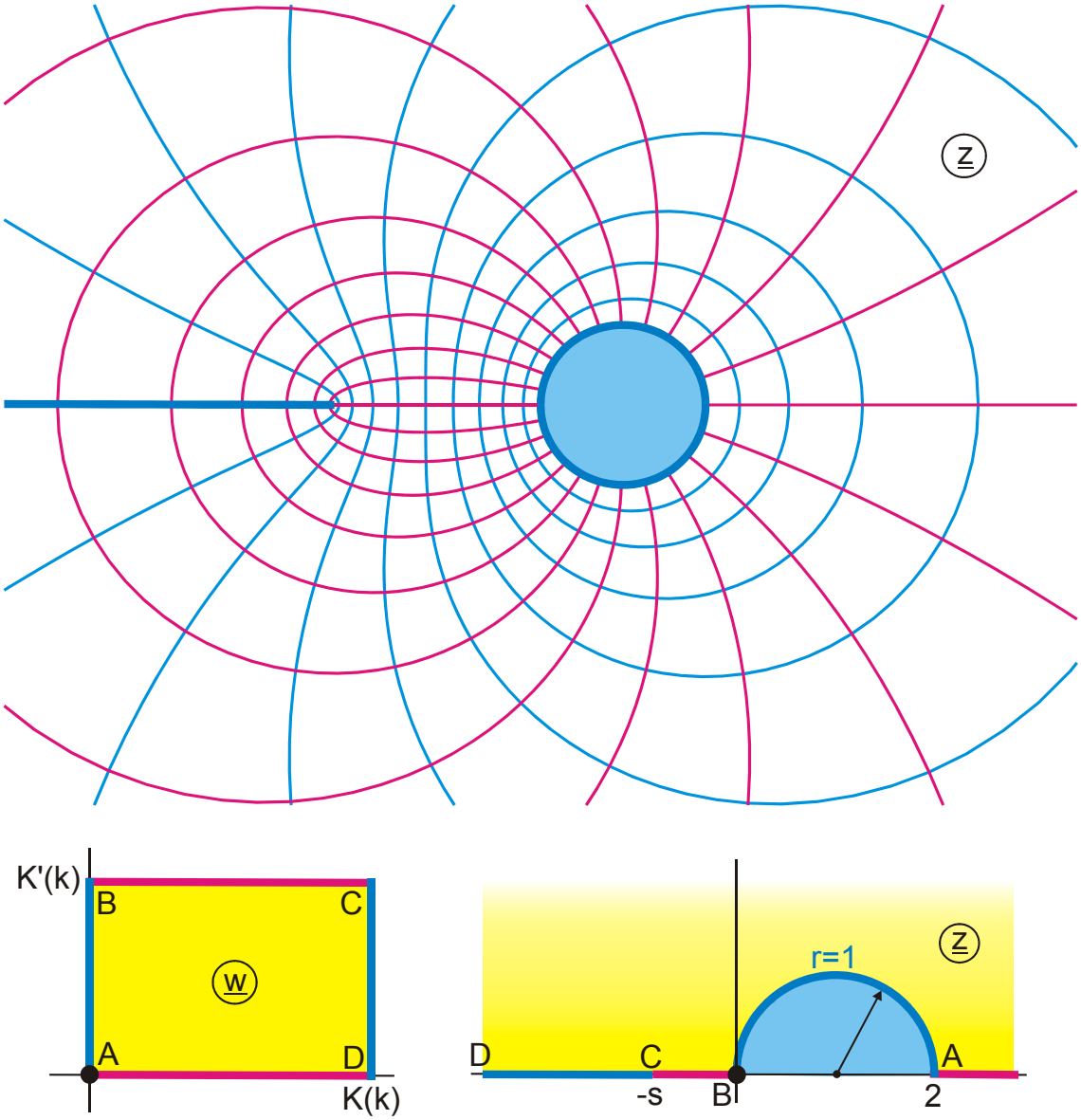


Abbildung K 4

$$z = \frac{2}{1 - \mathrm{sn}(w,k)}$$

$$k = \frac{s}{s+2}$$

$0 \le u \le K(k)$ $0 \le v \le K'(k)$

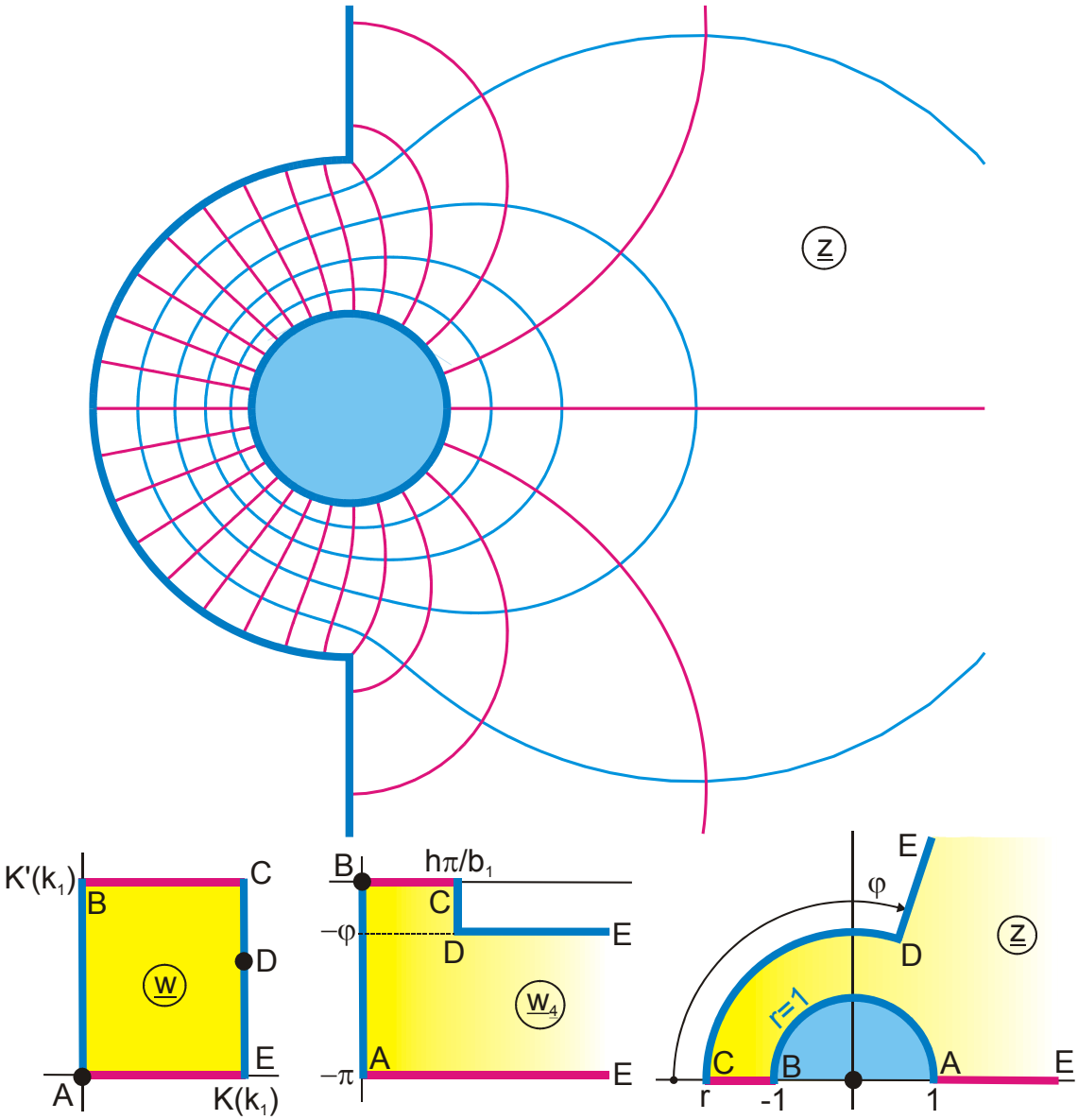


Abbildung K 4.1

$z = -\exp(w_4)$ $\quad w_4 = \pi(h - w_3)/b_1$ $\quad w_3 = \Pi_e(w_2, k, a)$

$w_2 = K(k) + jK'(k) - F_a(w_1, k)$ $\quad w_1 = [k_1/k]\,\mathrm{sn}(w, k_1)$

gegeben : $\tau = K'(k)/K(k)$, d $\quad h = K(k)\{1 + b\,Z_e(a,k)\}$

$b_1 = b\left\{K'(k)\,Z_e(a,k) + \dfrac{\pi a}{2K(k)}\right\} + K'(k)$ $\quad v_D = \mathrm{Im}\,F_a\left(\dfrac{k}{k_1}, k_1\right)$

$b_2 = b\left\{K'(k)\,Z_e(a,k) + \dfrac{\pi a}{2K(k)} - \dfrac{\pi}{2}\right\} + K'(k)$ $\quad r = \exp\dfrac{h\pi}{b_1}$

$a = (1-d)\,K(k)$ $\quad \varphi = b_2\pi/b_1$ $\quad k = \{\vartheta_2(0,\tau)/\vartheta_3(0,\tau)\}^2$

$k_1 = k\,\mathrm{sn}\{d\;K(k), k\}$ $\quad \tau = 2{,}2;\ d = 0{,}3505$ $\quad b = \dfrac{\mathrm{sn}(a,k)}{c\,\mathrm{n}(a,k)\,\mathrm{dn}(a,k)}$

$0 \le u \le K(k_1)$ $\quad 0 \le v \le K'(k_1)$

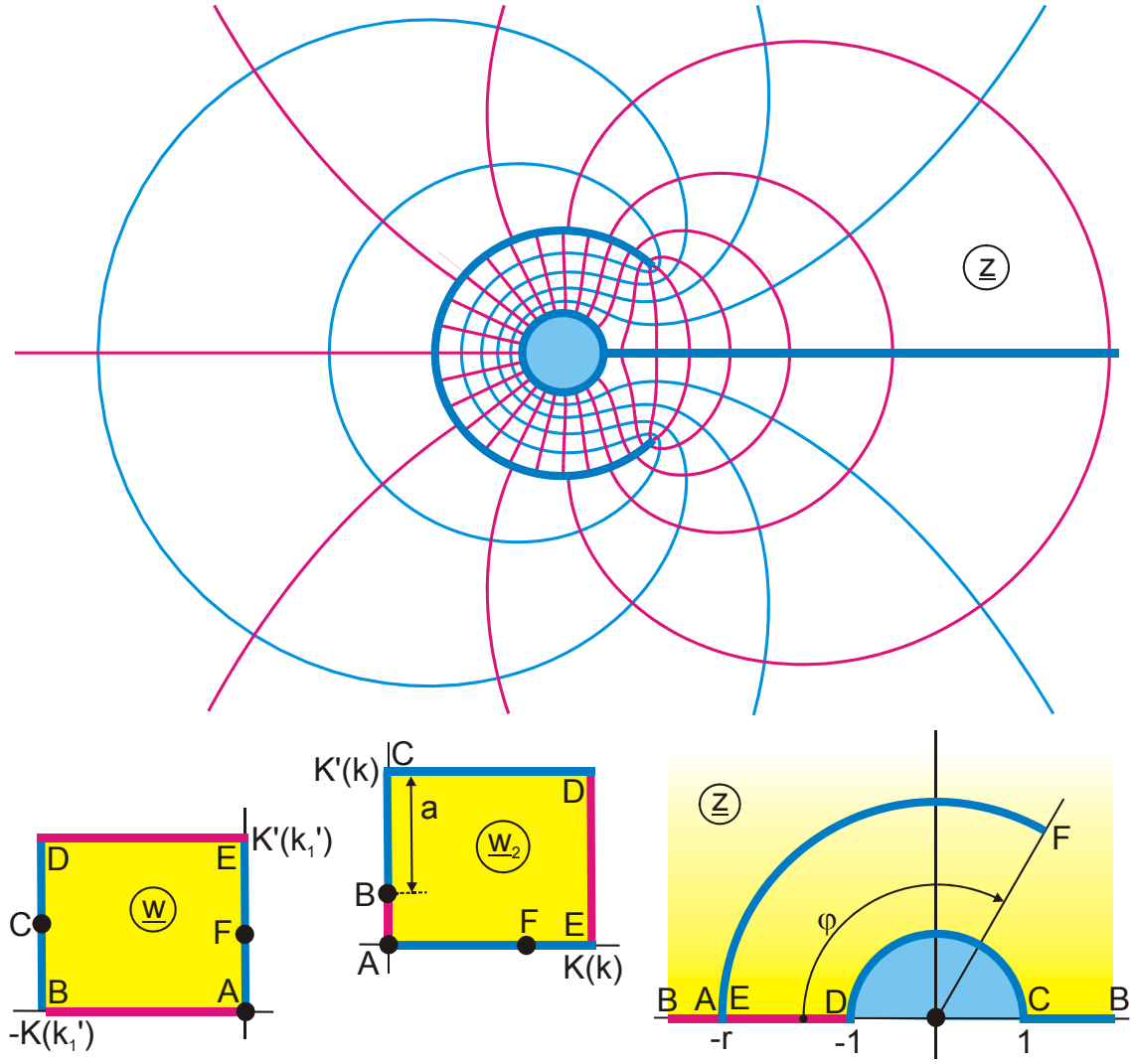


Abbildung K 4.2

$$z = -r\frac{\vartheta_4\left[\frac{\pi}{2K}(w_2 - ja),\tau\right]}{\vartheta_4\left[\frac{\pi}{2K}(w_2 + ja),\tau\right]}$$

$$w_2 = -jF_a(w_1, k')$$

$$\sigma = \frac{Z(ja,k)}{k^2\,sn(ja)\left[cn(ja)\,dn(ja) + sn(ja)Z(ja,k)\right]}$$

$$w_1 = \frac{k_1'}{k'}sn(w, k_1')$$

$$a = \frac{K(k)}{\pi}\ln r$$

$$u_F = F_a\left(\sqrt{\sigma}, k\right)$$

$$\varphi = 2\arg\vartheta_4\left[\frac{\pi}{2K}(u_F + ja),\tau\right]$$

$$v_B = K'(k) - a$$

$$0 < a < K'(k)$$

$$\tau = \frac{K'(k)}{K(k)}$$

$$k_1' = k'\,sn(v_B, k')$$

$$v_B = K'(k) - a$$

$$-K'(k_1) \le u \le 0 \qquad \text{gegeben: r, k} \qquad 0 \le v \le K(k_1)$$

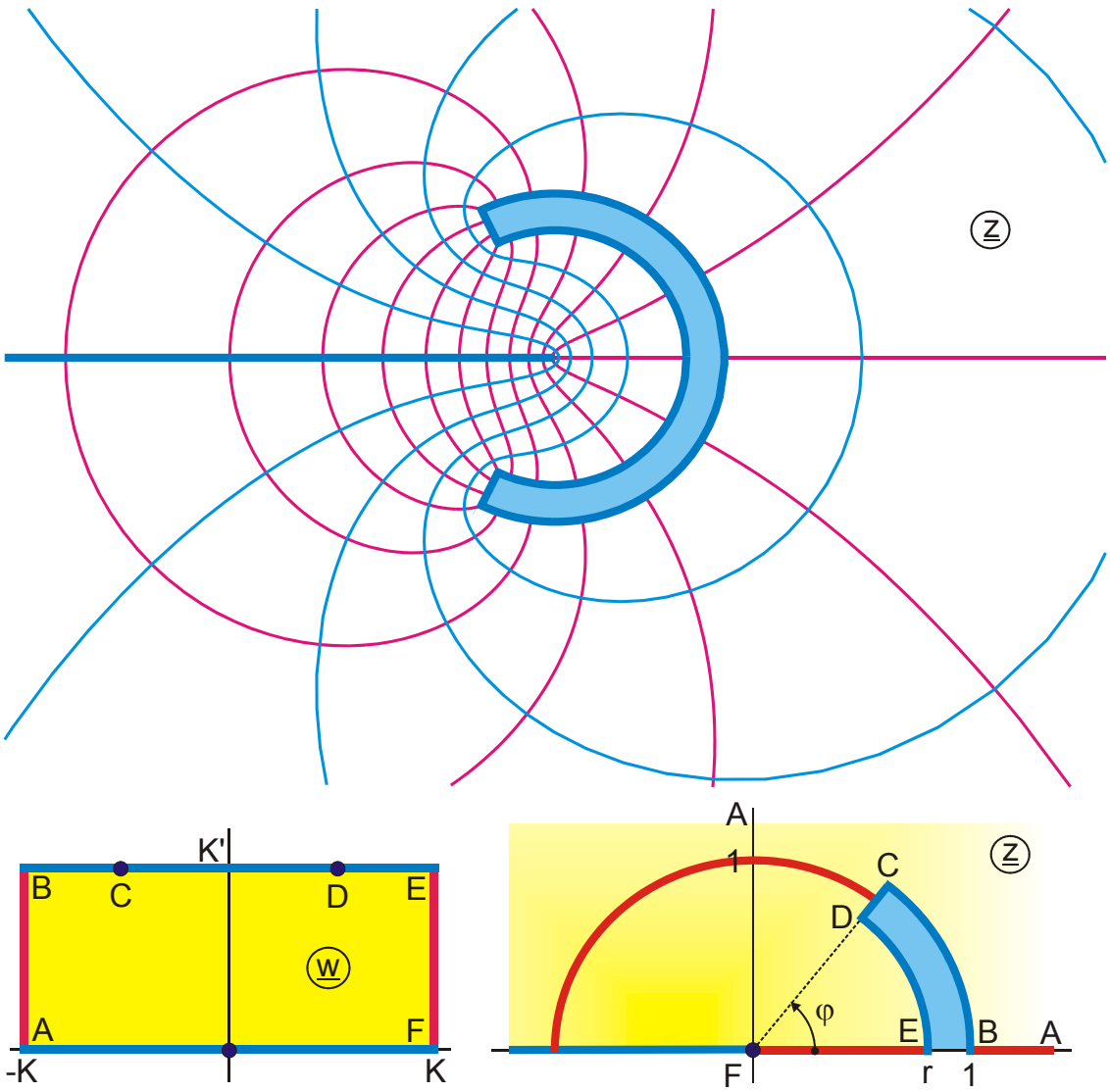


Abbildung K 4.3

$z = \frac{1}{r_2}\exp(2w_3)$ gegeben: d, τ

$w_3 = \Pi_j(w_2, k_1, a)$ $w_2 = K(k_1) + jK'(k_1) - F_a(w_1, k_1)$

$w_1 = k\ sn(w, k)$ $k_1 = \{\vartheta_2(0,\tau)/\vartheta_3(0,\tau)\}^2$

$a = (1\text{-}d)K(k_1)$ $\tau = K'(k_1)/K(k_1)$

$k = sn\ [d\ K(k_1), k_1]$ $g = K(k_1)\ Z_e(a, k_1)$

$u_D = -u_C = \mathrm{Re}\, F_a\left(\frac{1}{k\,k_1}, k\right)$ $f = \frac{\pi}{2} - K'(k_1)\ Z_e(a, k_1) - \frac{\pi a}{2K(k_1)}$

$r_2 = \exp(2g)$ $r = \exp(-4g)$ $\varphi = 2f\ 180/\pi$

$-K(k) \le u \le K(k)$ $0 \le v \le K'(k)$

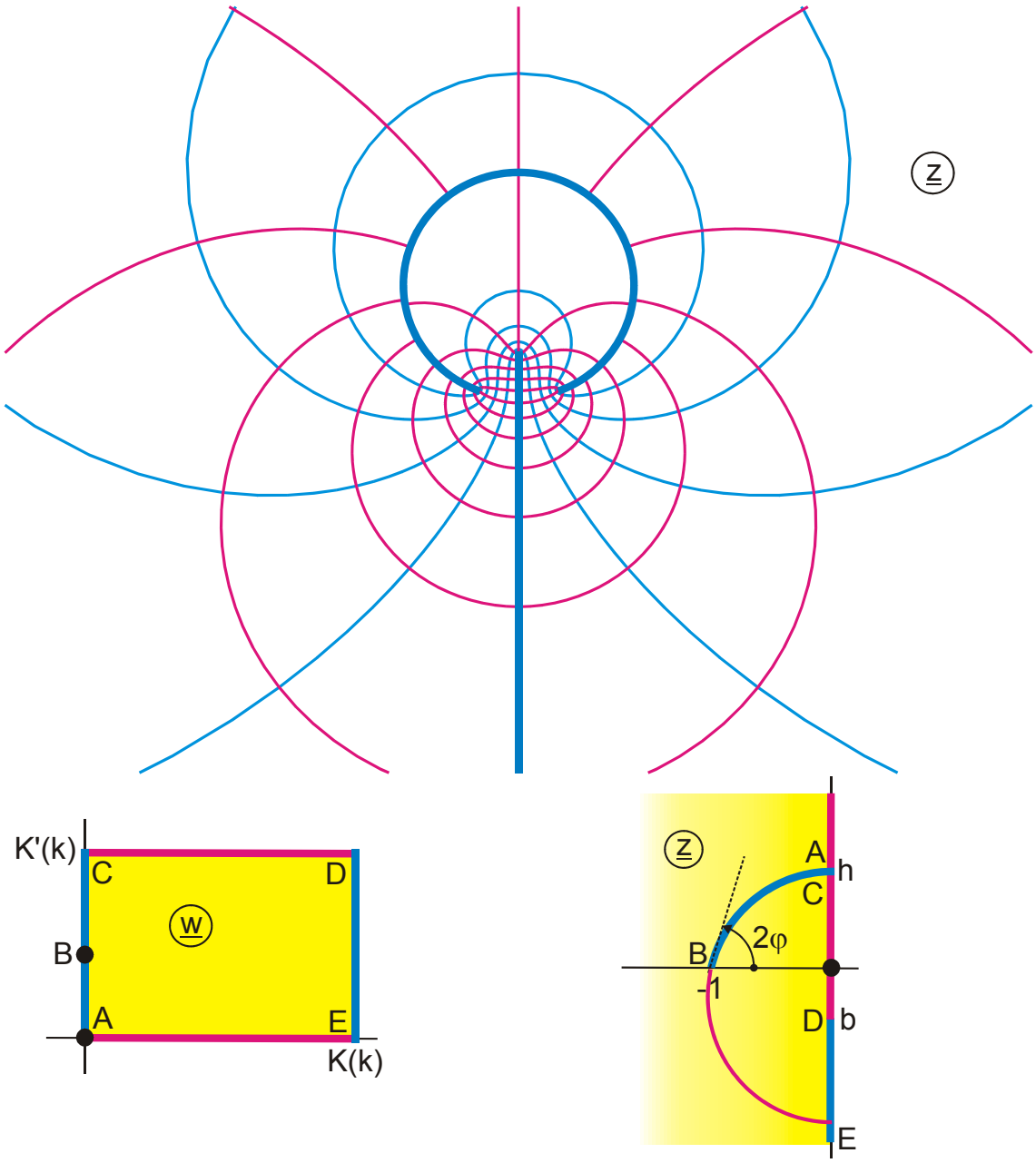


Abbildung K 4.4

$$z = \frac{1}{2}\left(w_2 + \frac{1}{w_2} \right)$$

$$w_2 = \frac{w_1 + j\sin\varphi}{\cos\varphi}$$

$$w_1 = j\frac{1+\mathrm{sn}(w,k)}{1-\mathrm{sn}(w,k)}$$

$$r = \frac{1}{\sin(2\varphi)}$$

$$k = \frac{a-1}{a+1}$$

$$h = \tan\varphi$$

$$a = \sin\varphi + \cos\varphi\left(b + \sqrt{1+b^2}\right)$$

gegeben: b, φ

$0 \le u \le K(k)$

$0 \le v \le K'(k)$

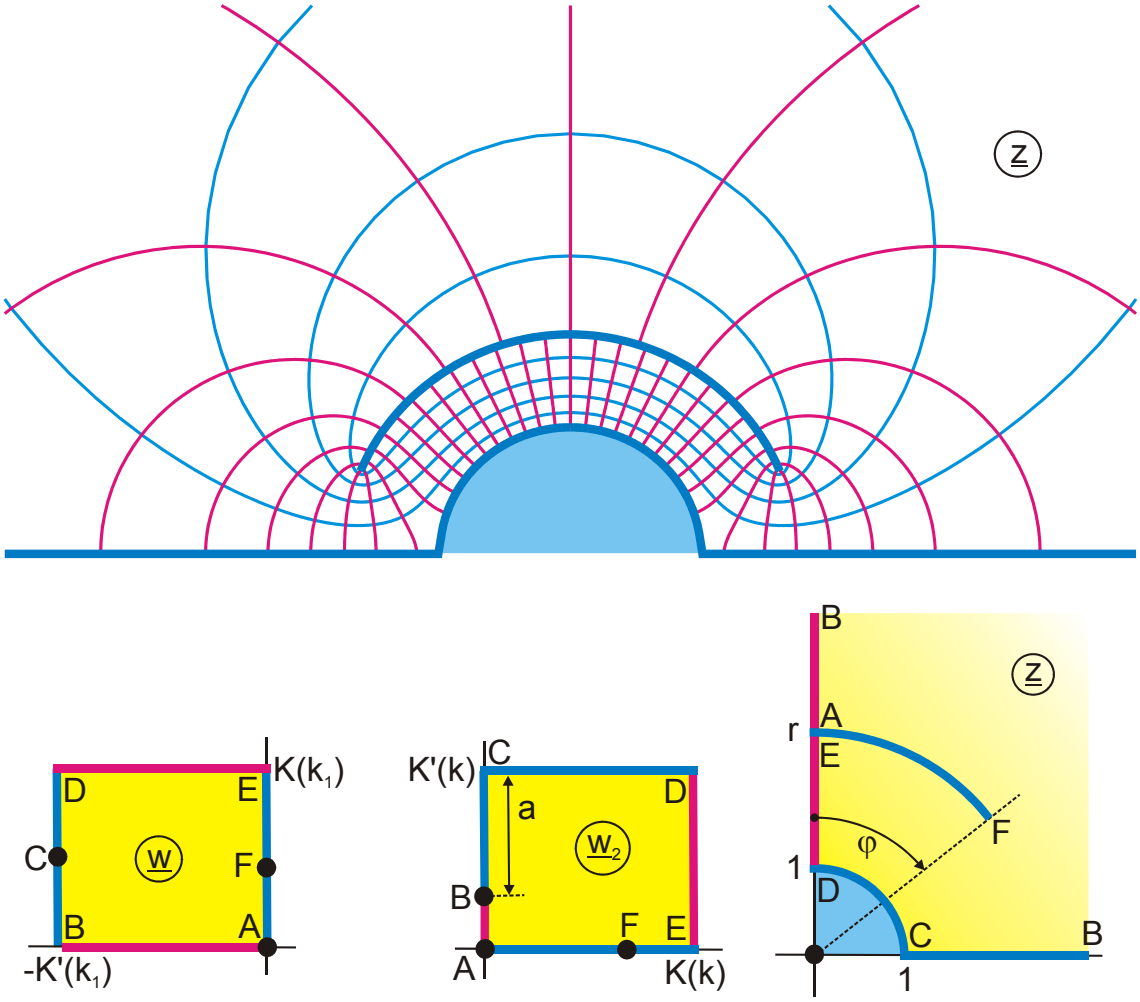


Abbildung K 4.5

$$z = jr\frac{\vartheta_4\left[\frac{\pi}{2K}(w_2 - ja),\tau\right]}{\vartheta_4\left[\frac{\pi}{2K}(w_2 + ja),\tau\right]}$$

$$w_2 = -jF_a(w_1, k')$$

$$\sigma = \frac{Z(ja,k)}{k^2\,sn(ja)\left[cn(ja)\,dn(ja) + sn(ja)Z(ja,k)\right]}$$

$$w_1 = \frac{k_1'}{k'}sn(w, k_1')$$

$$a = \frac{2K(k)}{\pi}\ln r$$

$$u_F = F_a\left(\sqrt{\sigma}, k\right)$$

$$\varphi = \arg\vartheta_4\left[\frac{\pi}{2K}(u_F + ja),\tau\right]$$

$$v_B = K'(k) - a$$

$$0 < a < K'(k)$$

$$\tau = \frac{K'(k)}{K(k)}$$

$$k_1' = k'sn(v_B, k')$$

$$v_B = K'(k) - a$$

$-K'(k_1) \le u \le 0$ gegeben: r, k $0 \le v \le K(k_1)$

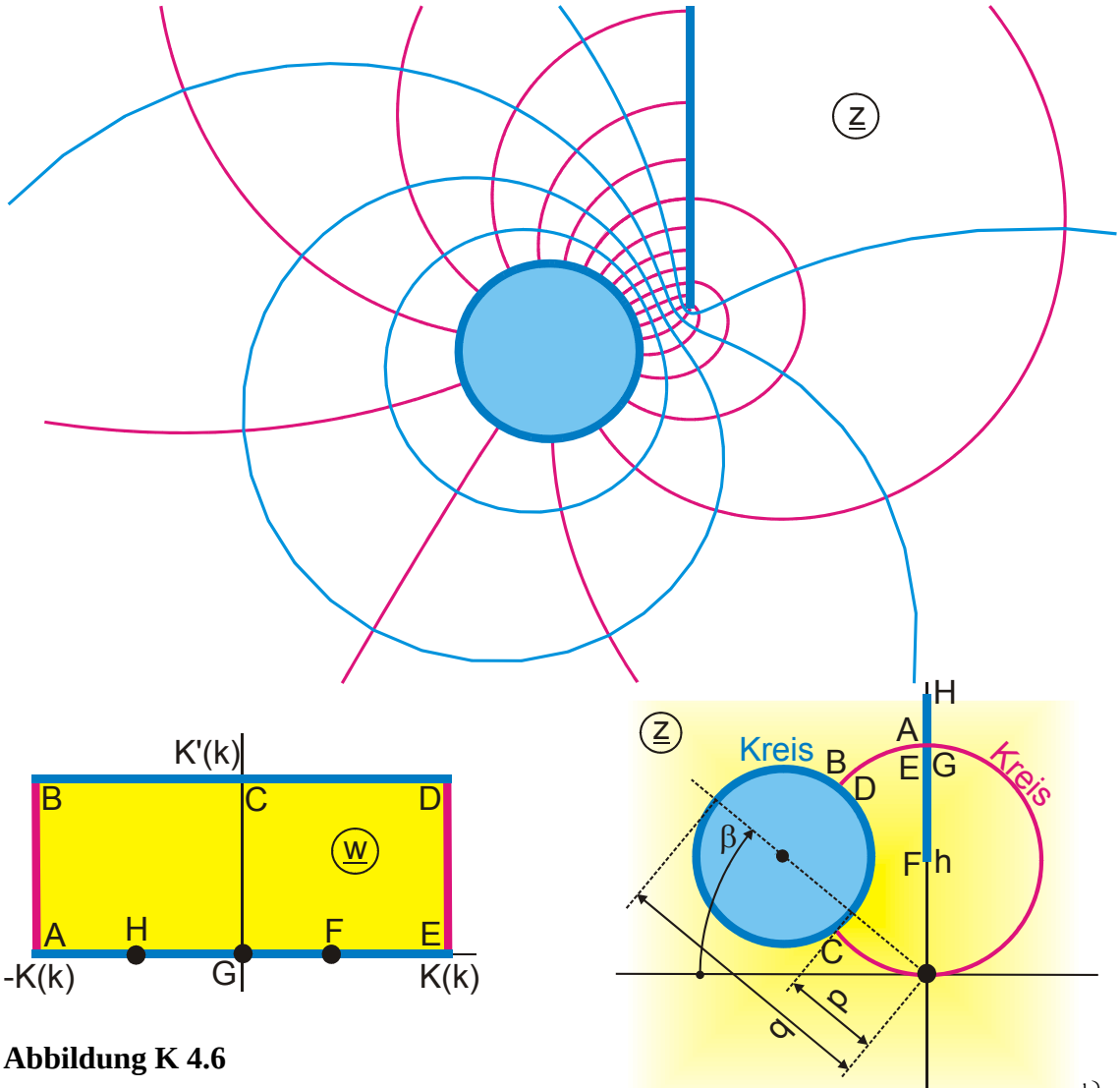


Abbildung K 4.6

$$z = \frac{1}{w_2 - s - jb} \qquad w_2 = \frac{1}{\rho w_1} + r \qquad w_1 = r\left\{1 + \frac{\vartheta_4\left[\frac{\pi}{2K(k)}(w + ja), \tau\right]}{\vartheta_4\left[\frac{\pi}{2K(k)}(w - ja), \tau\right]}\right\}$$

$$r = s - \sqrt{s^2 - 1} \qquad \sigma = \frac{Z(ja,k)}{k^2\,sn(ja)\left[cn(ja)\,dn(ja) + sn(ja)Z(ja,k)\right]}$$

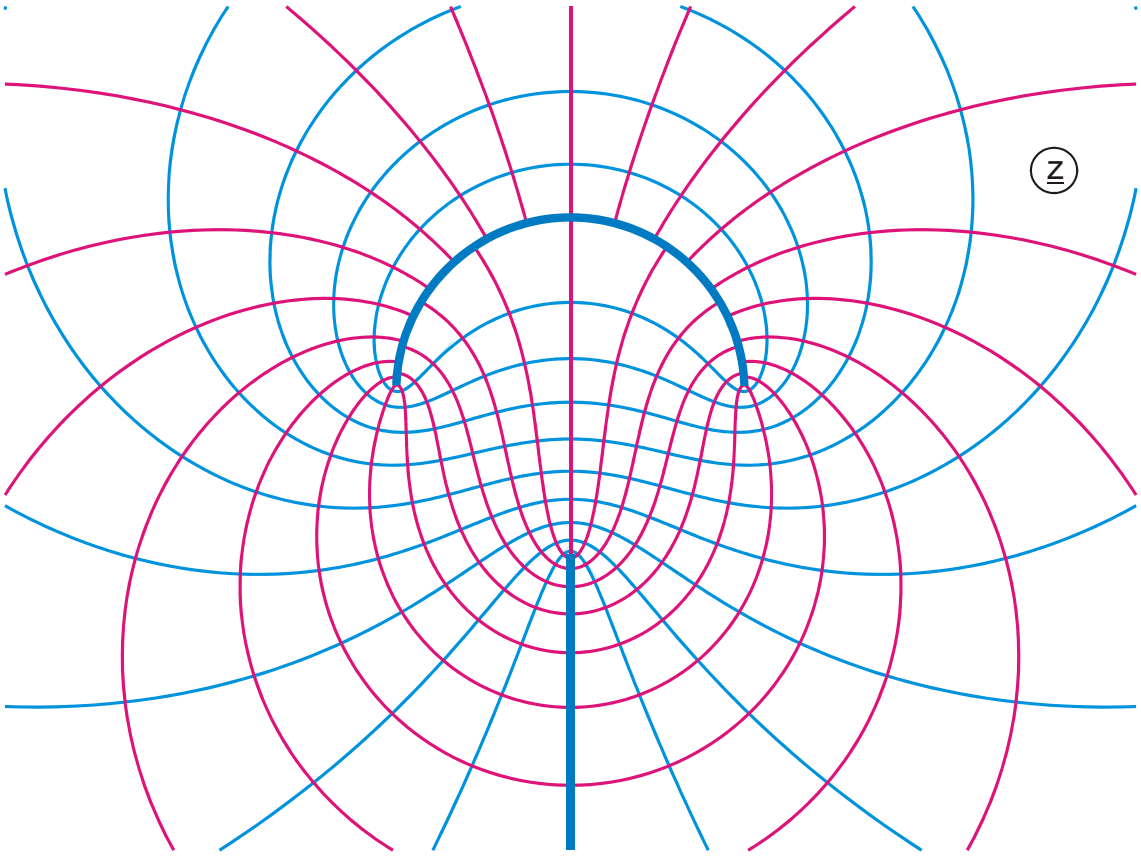
$$a = -\frac{K(k)}{\pi}\ln r \qquad h = \frac{1}{2b} \qquad u_F = F_a\left(\sqrt{\sigma}, k\right)$$

$$\varphi = 2\arg\vartheta_4\left[\frac{\pi}{2K(k)}(u_F + ja), \tau\right] \qquad b = \frac{1}{\rho}\operatorname{Im} r_1 \qquad \rho = \frac{1}{1 - r^2}$$

$$r_1 = \frac{1}{r + r\exp(-j\varphi)} \qquad 0 < a < K'(k) \qquad \tau = \frac{K'(k)}{K(k)}$$

$$p = \left|\frac{1}{s + jb + \exp(j\beta)}\right| \qquad r_2 = \frac{1}{r} + \left(-\frac{r_1}{\rho}\right)^* \qquad \beta = \arg r_2 \qquad \text{gegeben: s, k}$$

$$q = \left|\frac{1}{s + jb - \exp(j\beta)}\right| \qquad -K(k) \le u \le K(k) \qquad 0 \le v \le K'(k)$$



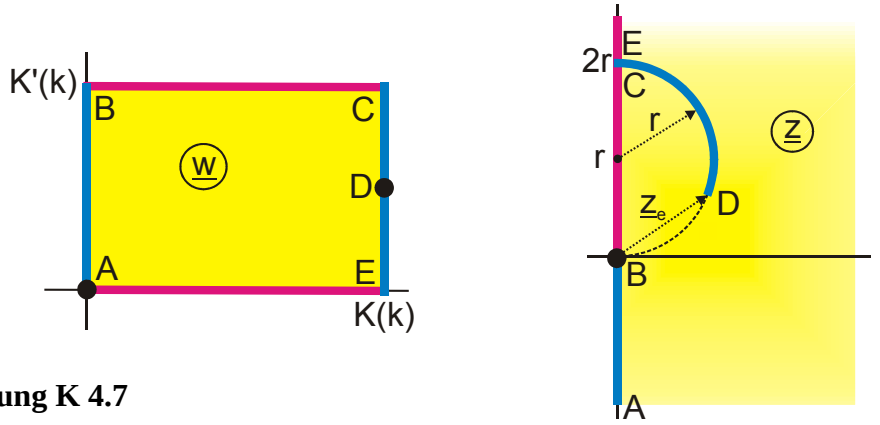


Abbildung K 4.7

$$z = 1/w_3$$

$$w_3 = \sqrt{w_2^{\,2}+1} - jh$$

$$w_1 = \mathrm{sn}^2(w,k)$$

$$k = \frac{1}{\sqrt{2b+1}}$$

$$r = \frac{1}{2h}$$

$$0 \le u \le K(k)$$

$$w_2 = -j\frac{w_1 - a}{b}$$

$$b = \frac{1}{h^2}\left(1+\sqrt{1+h^2}\right)$$

$$a = \frac{1}{2}\left(\frac{1}{k^2}+1\right)$$

$$\underline{z}_e = \frac{1}{1-jh}$$

$$0 \le v \le K'(k)$$

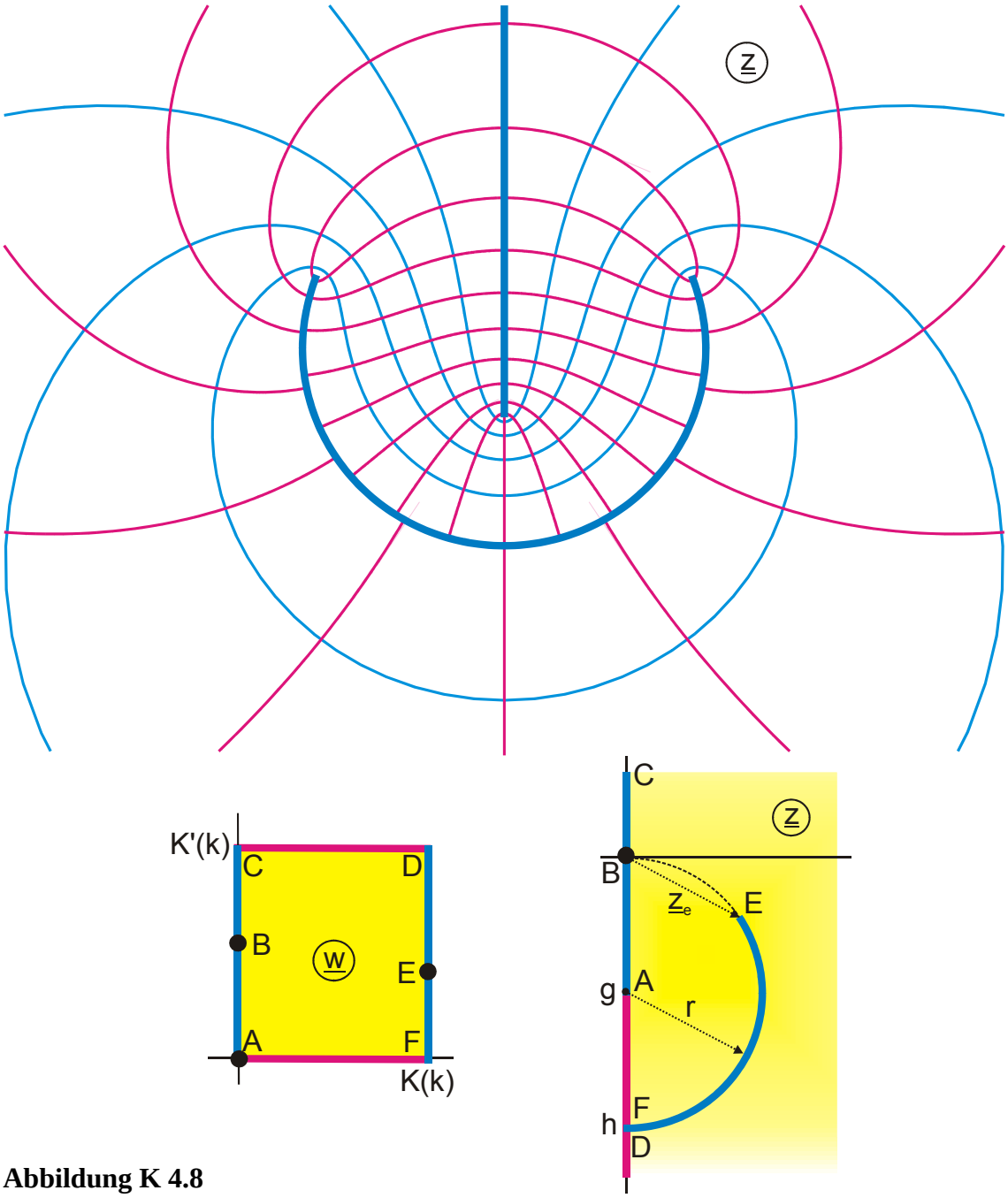


Abbildung K 4.8

$$z = 1/(w_1 - jd) \qquad w_1 = \frac{\sqrt{k}}{2}\{\mathrm{sn}(w + ja,k) - \mathrm{sn}(w - ja,k)\}$$

$$a = \mathrm{Im}\, F_a\left(\frac{jh}{\sqrt{k}},k\right) \qquad v_E = F_a\left(\sqrt{\frac{1+k^2\,\mathrm{sn}^2(ja,k)}{2-k'^2+2k^2\,\mathrm{sn}^2(ja,k)}},k'\right)$$

$$s = \frac{\sqrt{k}}{2}\{\mathrm{sn}(K(k) + jv_E + ja,k) - \mathrm{sn}(K(k) + jv_E - ja,k)\} \qquad h = \sqrt{k}\,\frac{\mathrm{sn}[a,k']}{\mathrm{cn}[a,k']}$$

$d = 1/h$	gegeben: k, h	g = 1/(h+d)
$\underline{z}_e = 1/s + jd$	$0 \le u \le K(k)$	$0 \le v \le K'(k)$

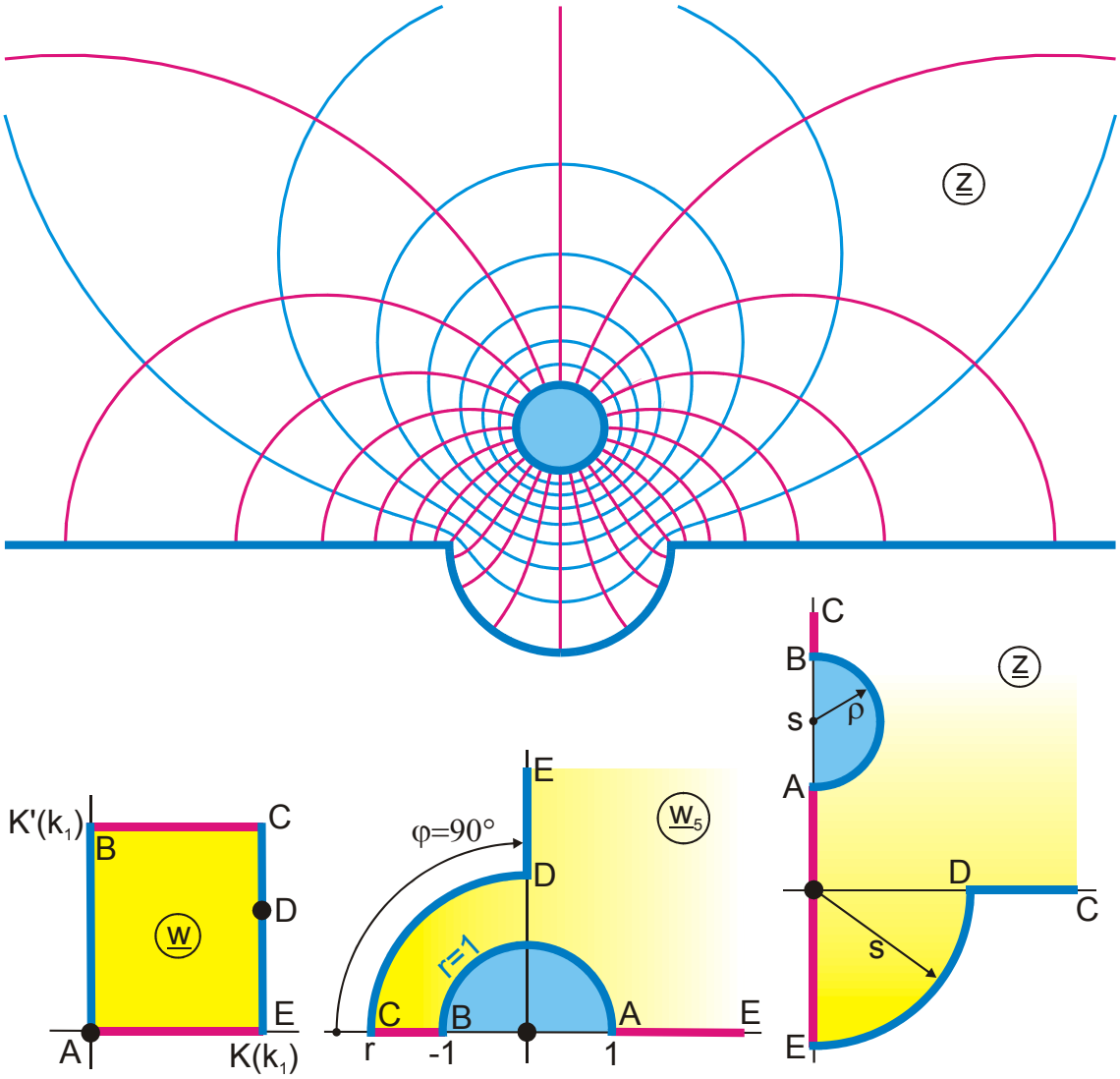


Abbildung K 4.9

$z = \exp(-j\pi/2)/w_5 - js$ $\quad s = 1/(2r)$ $\quad \rho = 1/(1+r^2)$

$w_5 = \exp(w_4) - r$ $\quad w_4 = \pi(h - w_3)/b_1$ $\quad w_3 = \Pi_e(w_2, k, a)$

$w_2 = K(k) + jK'(k) - F_a(w_1, k)$ $\quad w_1 = [k_1/k]\,\mathrm{sn}(w, k_1)$

gegeben : $\tau = K'(k)/K(k)$, d $\quad h = K(k)\{1 + b\,Z_e(a,k)\}$

$$b_1 = b\left\{K'(k)\,Z_e(a,k) + \frac{\pi a}{2K(k)}\right\} + K'(k) \qquad v_D = \mathrm{Im}\,F_a\left(\frac{k}{k_1}, k_1\right)$$

$$b_2 = b\left\{K'(k)\,Z_e(a,k) + \frac{\pi a}{2K(k)} - \frac{\pi}{2}\right\} + K'(k) \qquad r = \exp\frac{h\pi}{b_1}$$

$a = (1-d)\,K(k)$ $\quad \varphi = b_2\pi/b_1$ $\quad k = \{\vartheta_2(0,\tau)/\vartheta_3(0,\tau)\}^2$

$k_1 = k\,\mathrm{sn}\{d\;K(k), k\}$ $\quad \tau = 2{,}2;\ d = 0{,}3505$ $\quad b = \dfrac{\mathrm{sn}(a,k)}{c\,\mathrm{n}(a,k)\,\mathrm{dn}(a,k)}$

$0 \le u \le K(k_1)$ $\qquad 0 \le v \le K'(k_1)$

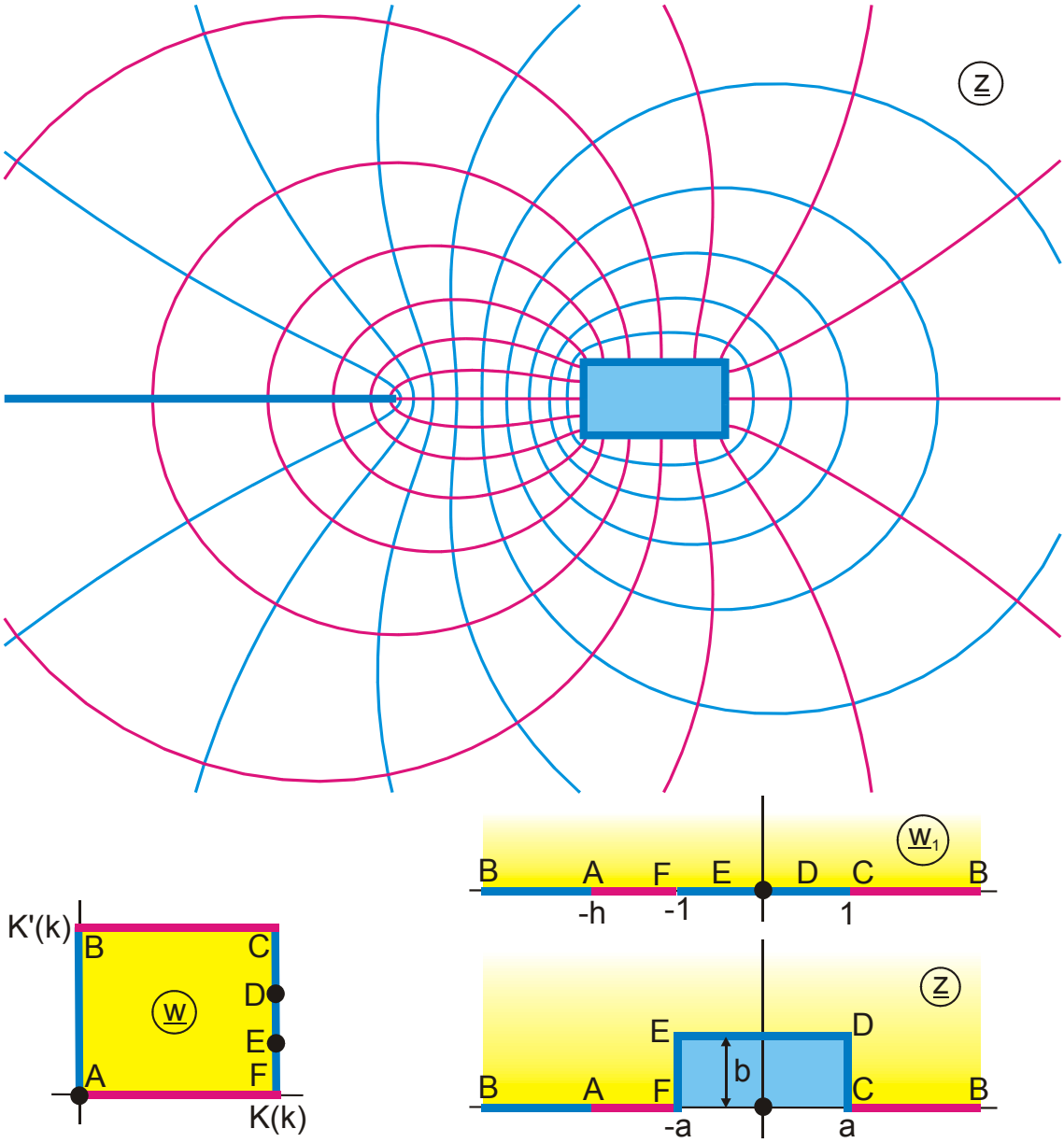


Abbildung K 5

$z = B_a(w_1/k_1,k_1) + jb$

$w_1 = \frac{2}{d} sn^2(w,k) - h$

$b = \frac{E'(k_1)}{k_1^2} - K'(k_1)$

$a = \frac{E(k_1) - k_1'^2 K(k_1)}{k_1^2}$

$h_1 = -B_a\left(-\frac{h}{k_1}, k_1\right)$

$d = \frac{1}{k^2} - 1$

$h = \frac{2}{d} + 1$

$0 \le v \le K'(k)$

$0 \le u \le K(k)$

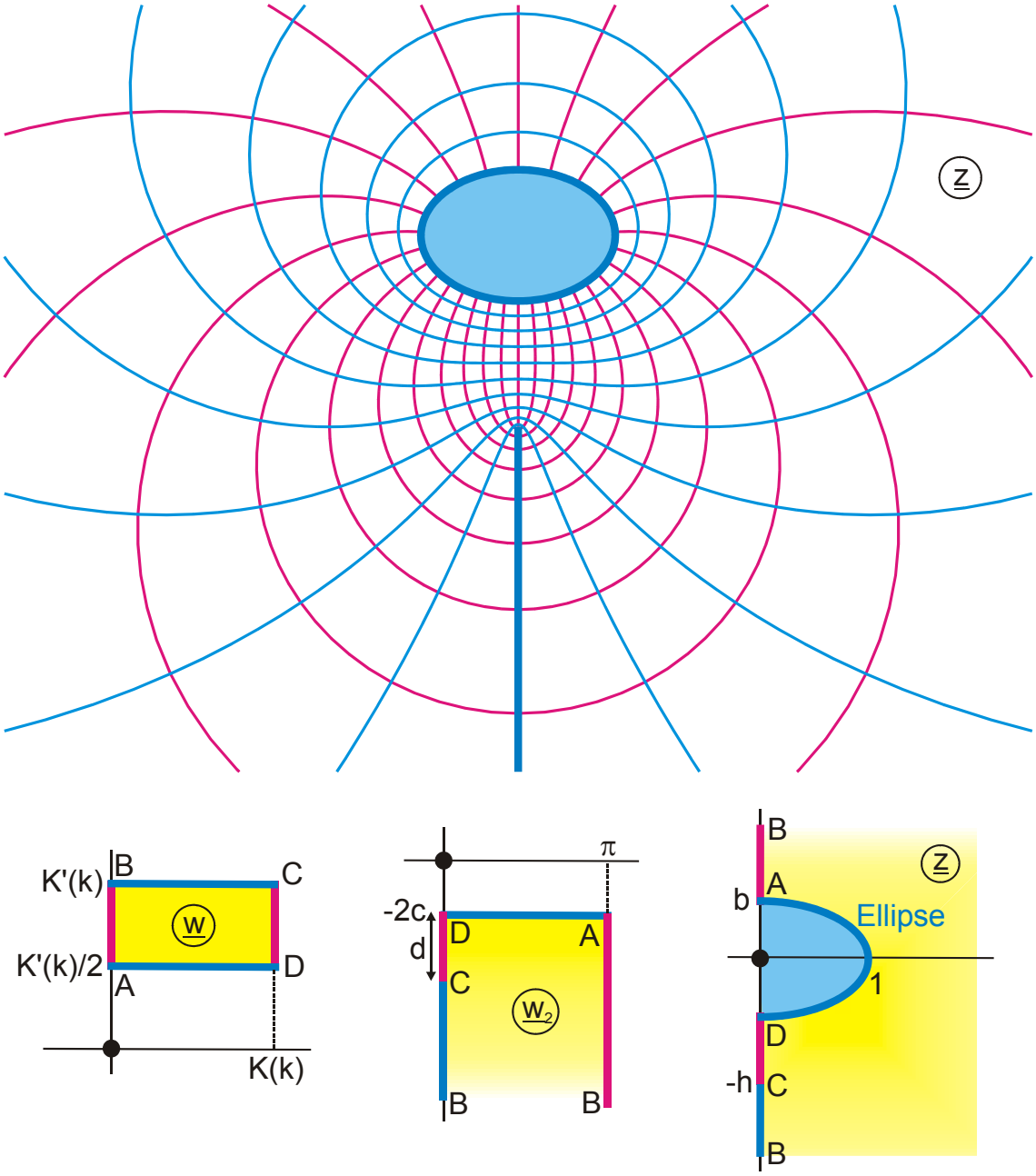


Abbildung K 6

$$z = \frac{\sin w_2}{\cosh(2c)}$$

$$w_2 = -2j\left(w_1 + c\right)$$

$w_1 = \ln sn\,(w,k) - d/2$

$$c = \frac{1}{2}\operatorname{ar\,tanh} b$$

$k = \exp(-d)$

$$d = \operatorname{ar\,sinh}\left\{h\cosh\left(2c\right)\right\} - 2c$$

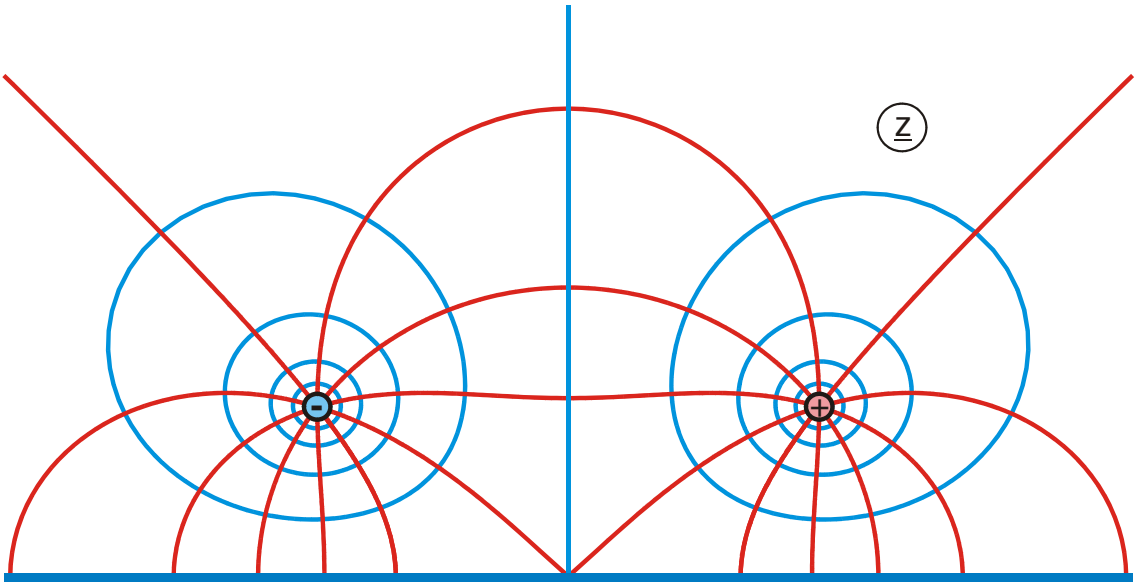
$0 \le u \le K(k)$

$K'(k)/2 \le v \le K'(k)$

gegeben: b, h

Abbildungen Gruppe L

Weitere Abbildungen mit Linienladungen



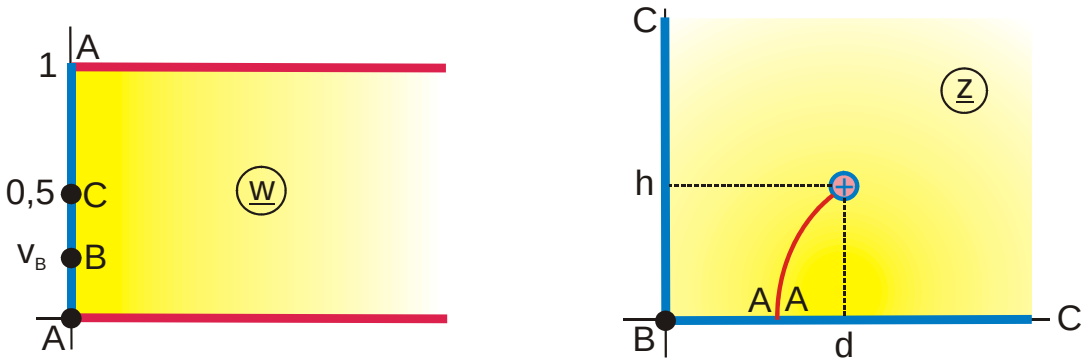


Abbildung L 1

$$z = \sqrt{b + ja\,\tanh(w\pi)}$$

$$b + ja = (d + jh)^2$$

$$v_B = \frac{1}{\pi}\arctan\frac{b}{a}$$

$$0 \le u \le 0{,}5$$

$$0 \le v \le 1$$

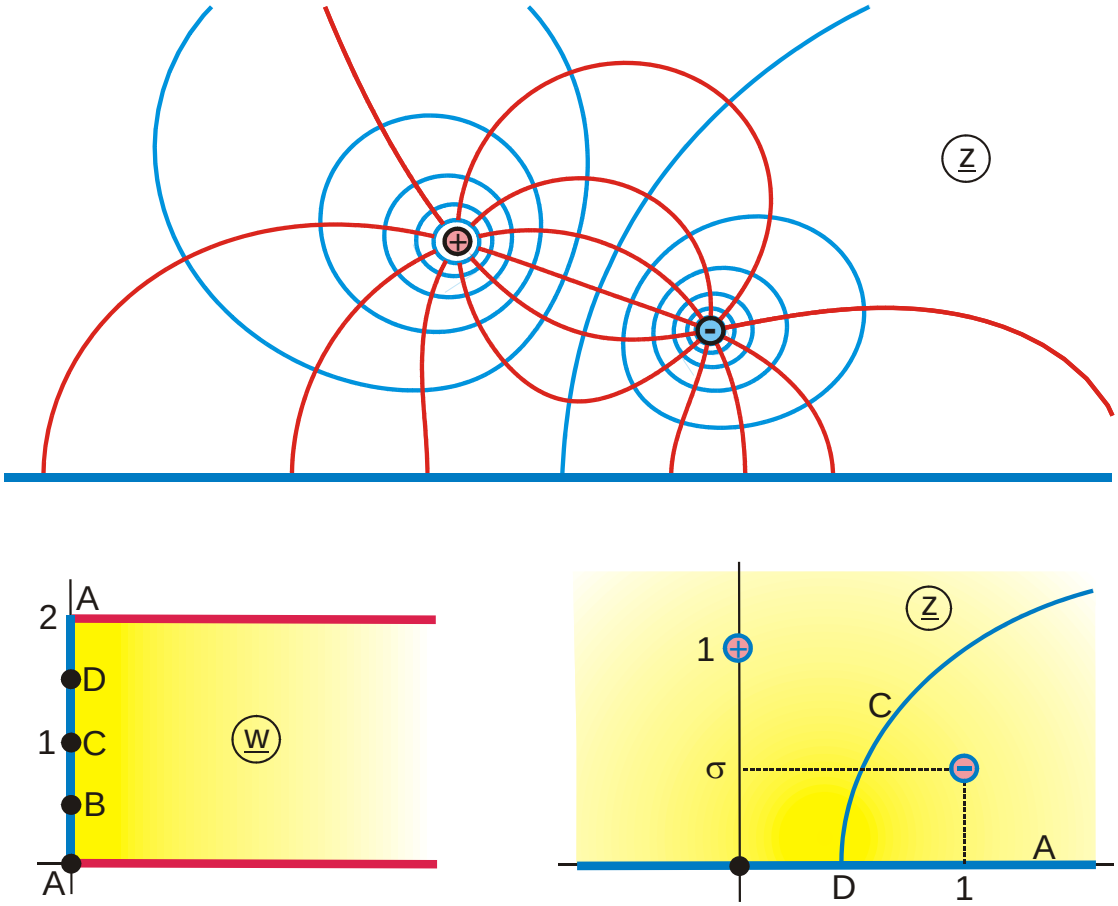


Abbildung L 1.1

$$z = -\frac{b}{2a} \pm \sqrt{\frac{c}{a} + \left(\frac{b}{2a}\right)^2}$$

$a = 1 - w_1$

$b = w_1 - 1 + j(1 + w_1)(1 - \sigma)$

$c = w_1 (\sigma + j) - (\sigma - j)$

$w_1 = \exp(\pi w)$

$0 \le u \le 0{,}8$

$0 \le v \le 2$

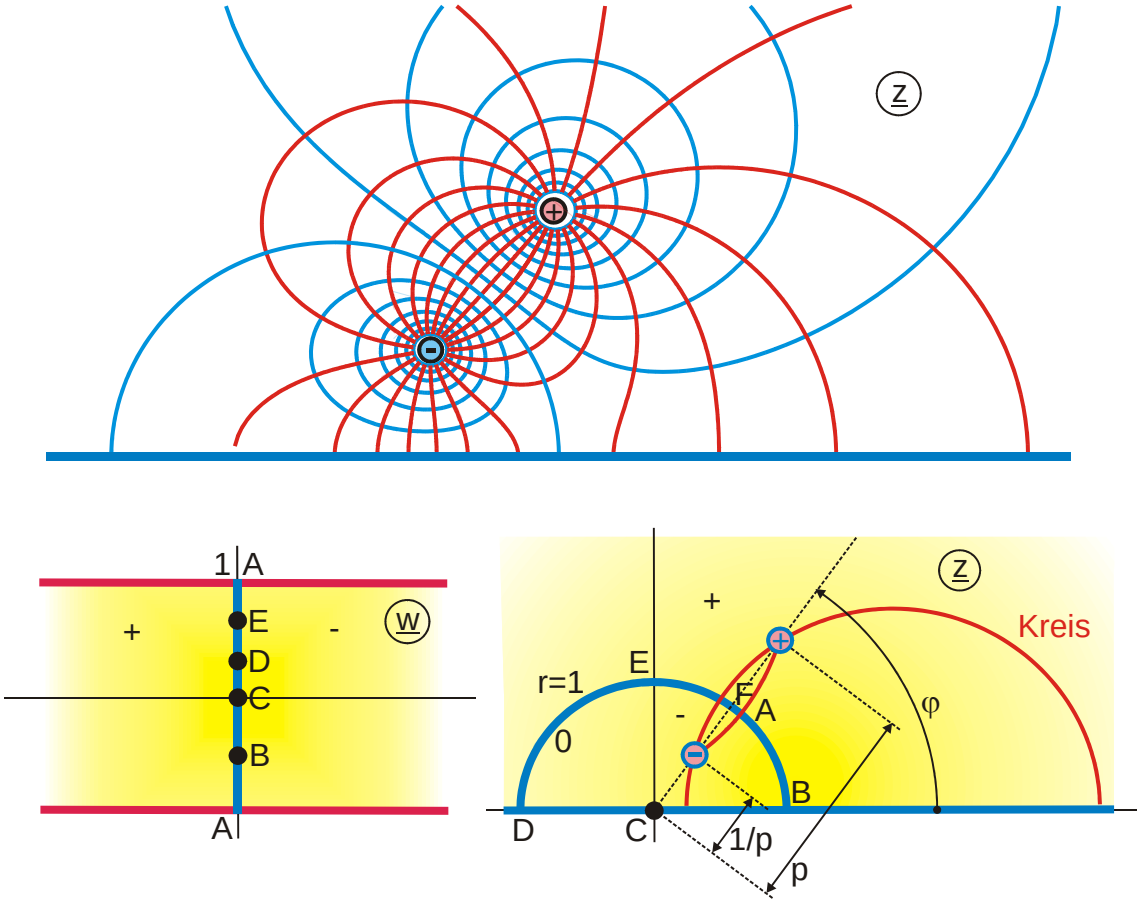


Abbildung L 1.2

$$z = \sqrt{d^2 - 1} - d$$

$d = b/(2a)$ $\qquad a = 1 - \exp(\pi w)$

$$b = \exp(j\varphi)\left[\frac{\exp(\pi w)}{p} - p\right] + \exp(-j\varphi)\left[p\exp(\pi w) - \frac{1}{p}\right]$$

siehe auch F 2.7

$-0{,}8 \le u \le 0{,}8$ $\qquad -1 \le v \le 1$

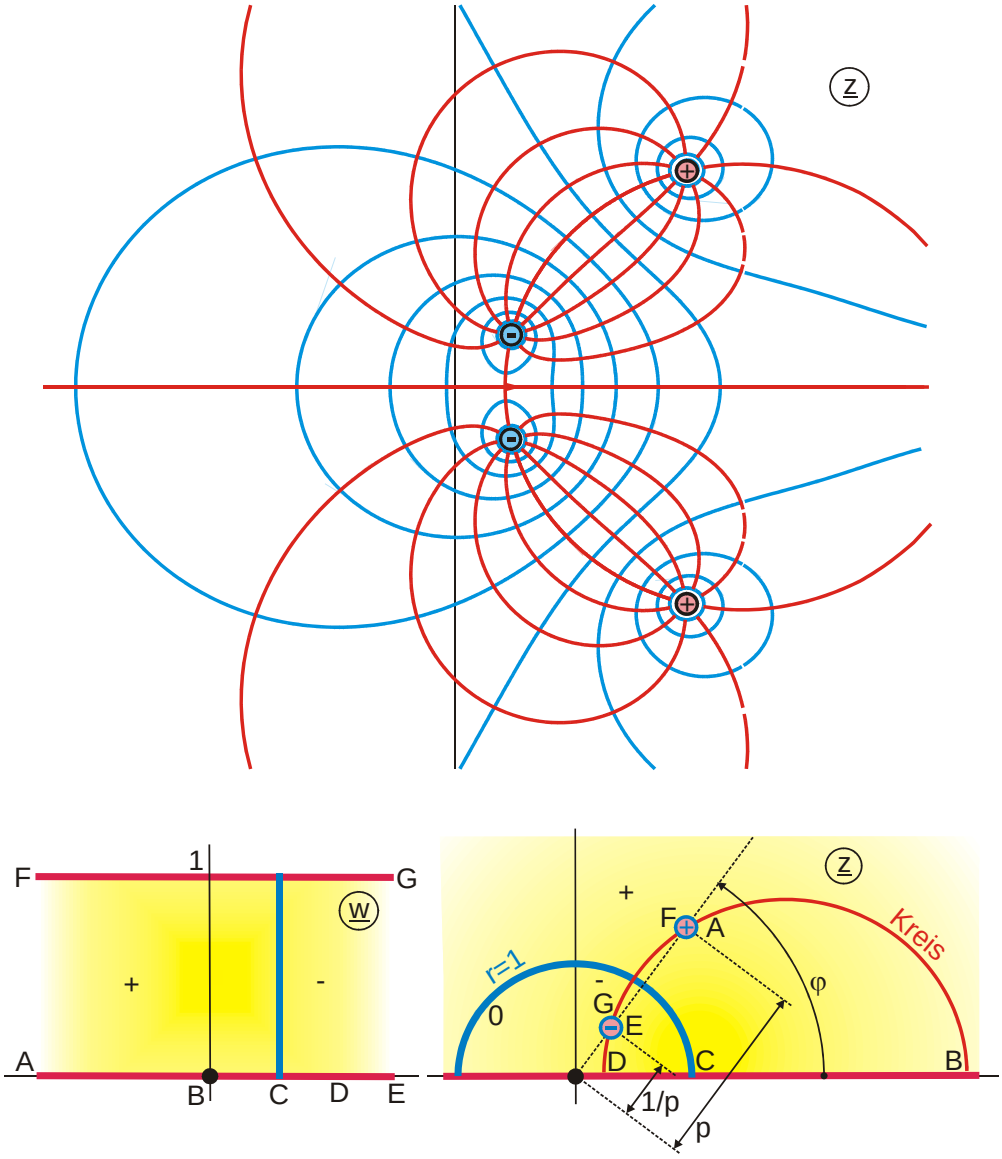


Abbildung L 1.3

$$z = \pm\sqrt{\frac{c}{a} + d^2} - d$$

$d = b/(2a)$ $\qquad a = 1 - \exp(\pi w)$

$$b = 2\left[\frac{\exp(\pi w)}{p} - p\right]\cos\varphi \qquad c = \frac{\exp(\pi w)}{p^2} - p^2$$

$$u_C = \frac{2}{\pi}\ln p$$

$-0{,}75 \le u \le 1{,}25$ $\qquad 0 \le v \le 1$

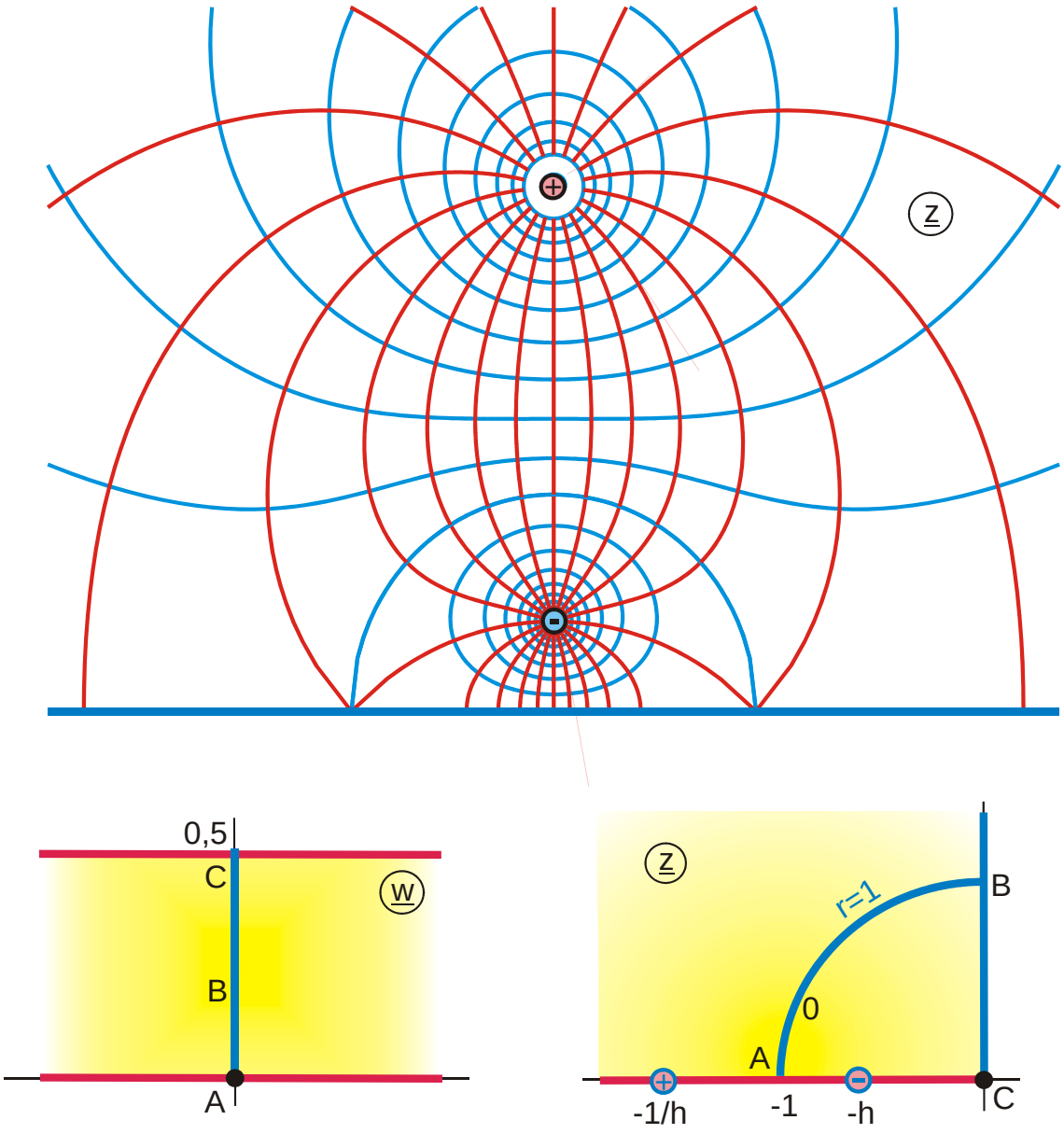


Abbildung L 1.4

$$z = -\sqrt{w_1^{\,2} + 1} - w_1$$

$w_1 = a \tanh(\pi w)$

$$a = \frac{h - 1/h}{2}$$

$$v_B = \frac{1}{\pi}\arctan(1/a)$$

$-0{,}6 \le u \le 0{,}4$ $\qquad$ $0 \le v \le 0{,}5$

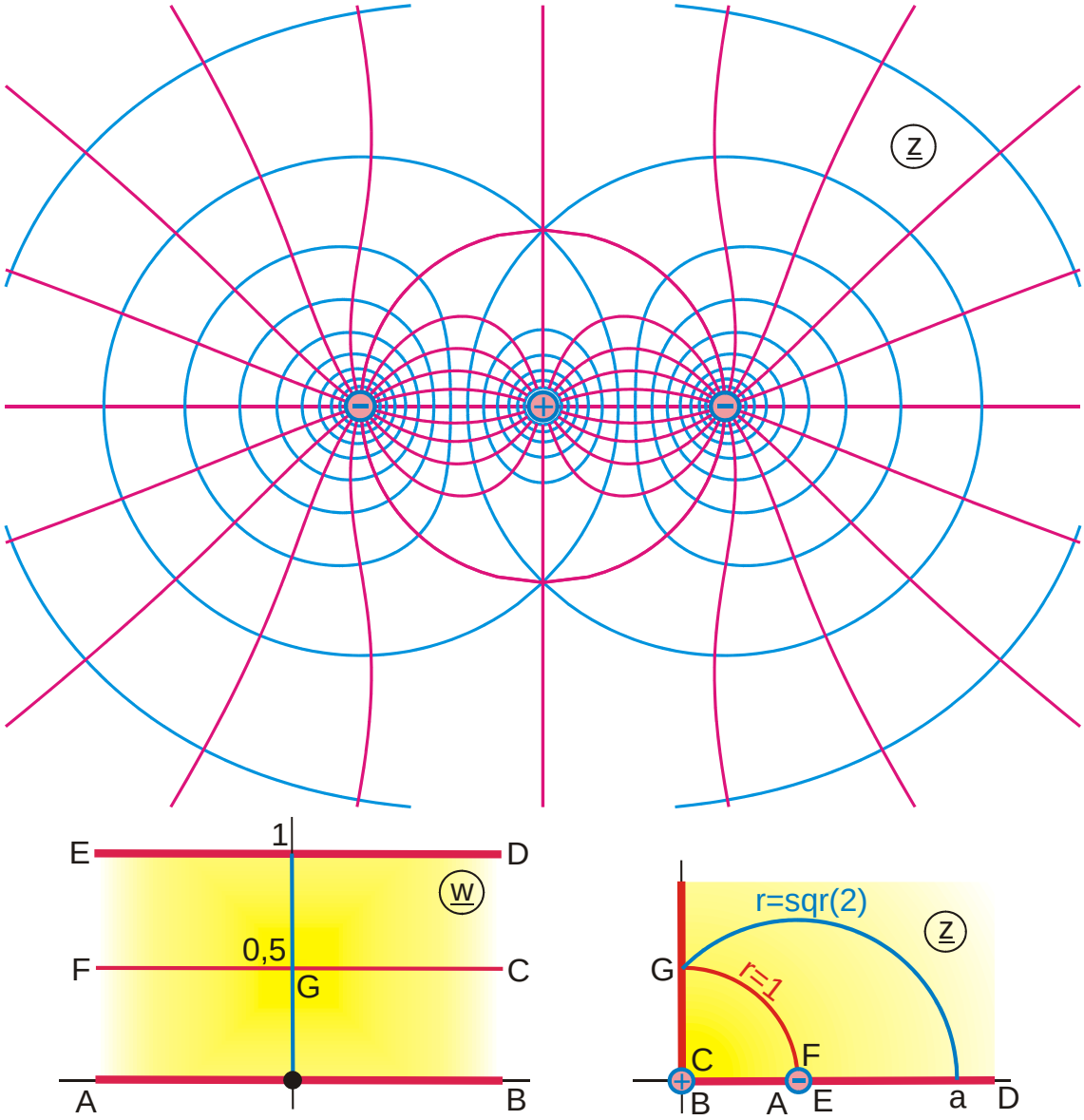


Abbildung L 1.5

$z = w_1 + \sqrt{w_1^2 + 1}$

$w_1 = \exp(\pi w)$

$a = 1 + \sqrt{2}$

$-0{,}8 \le u \le 0{,}5$ $\qquad$ $0 \le v \le 1$

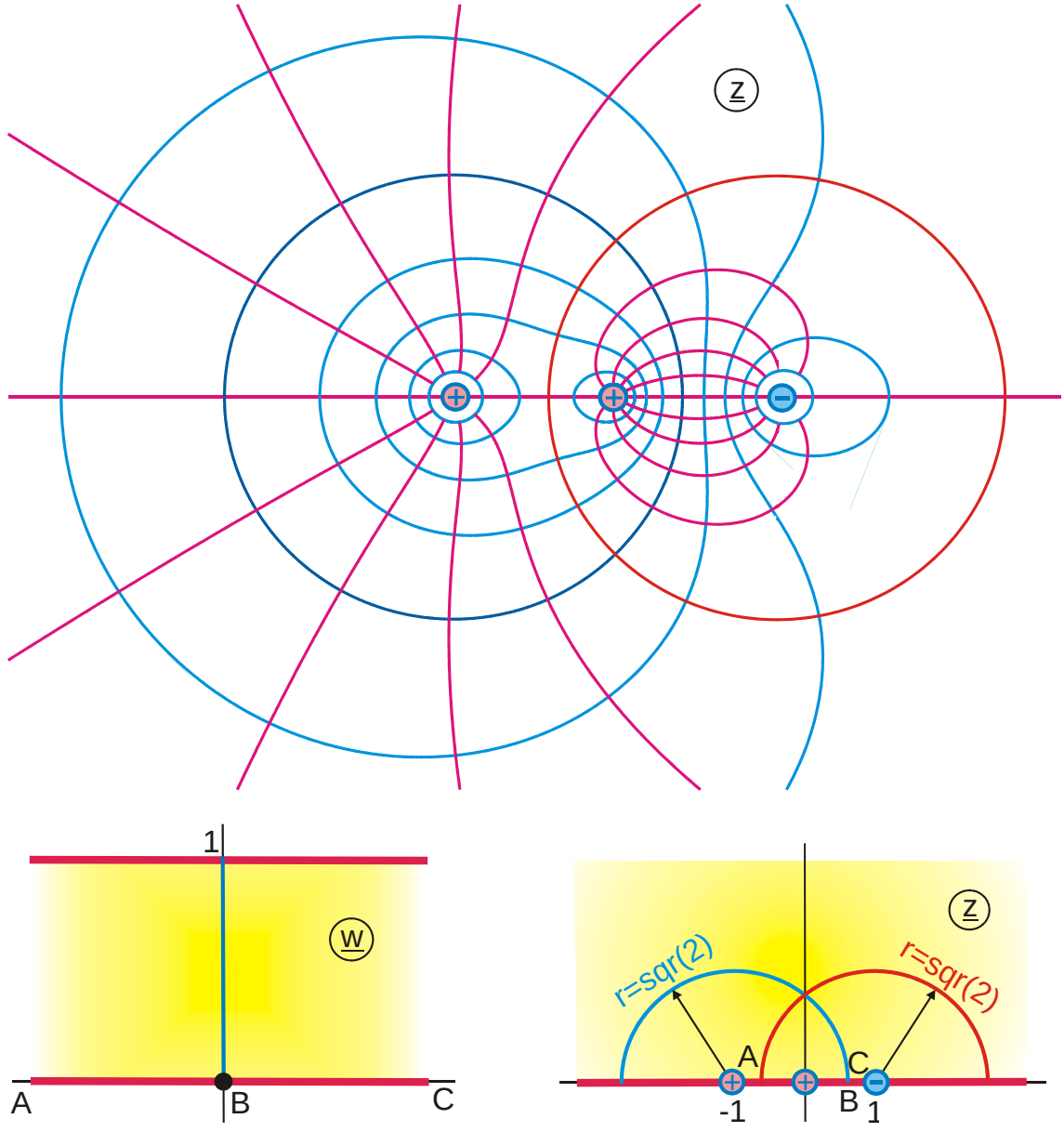


Abbildung L 1.6

$$z = w_1 - 1 \pm \sqrt{(w_1 - 1)^2 - w_1}$$

$w_1 = \exp(\pi w)$

$-0{,}8 \le u \le 0{,}8$ $\qquad$ $0 \le v \le 1$

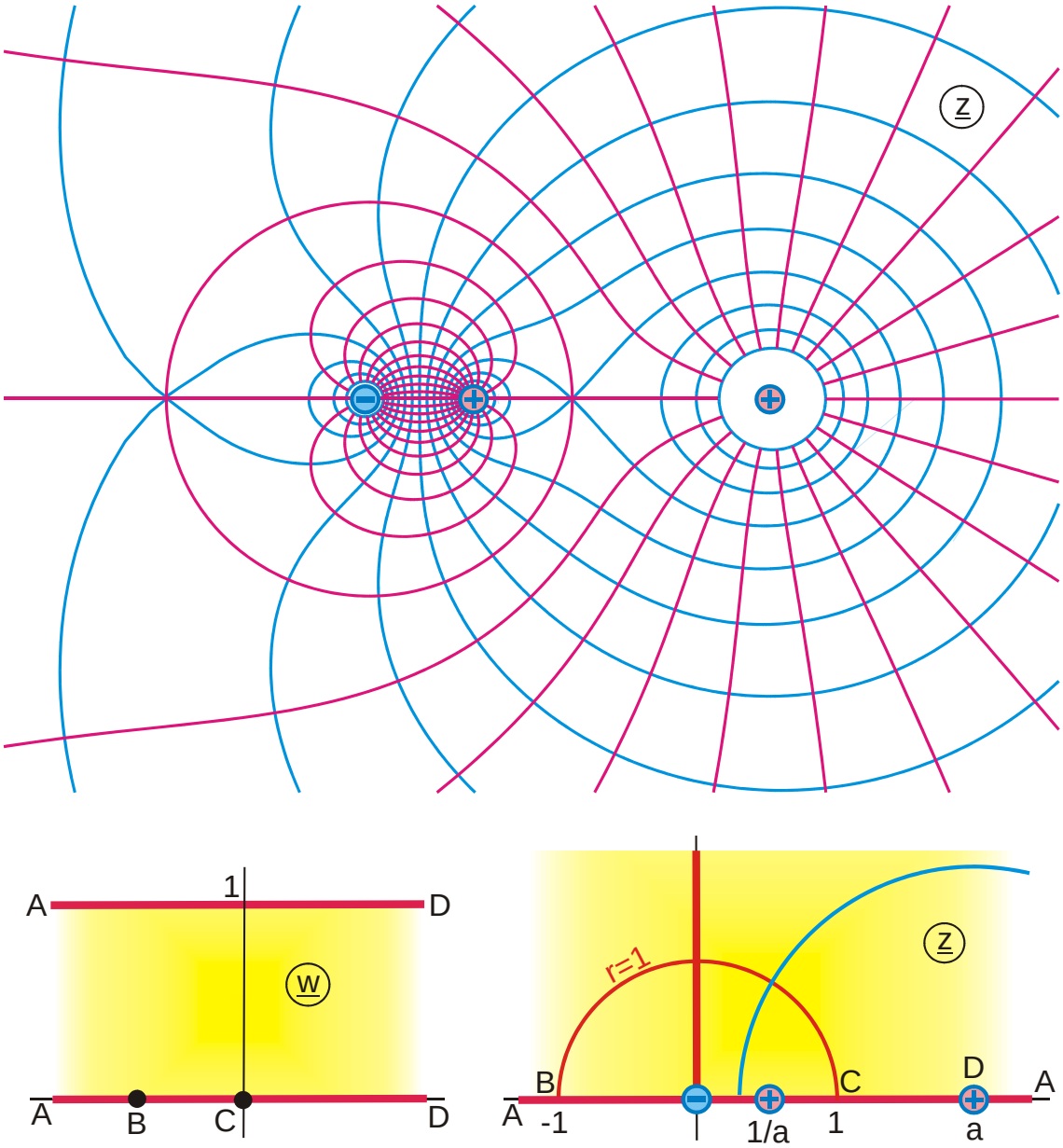


Abbildung L 1.7

$z = \exp(2w_3)$

$w_3 = ar\tanh w_2$

$w_2 = \pm\sqrt{\frac{w_1 - 1}{b^2 w_1 - 1}}$

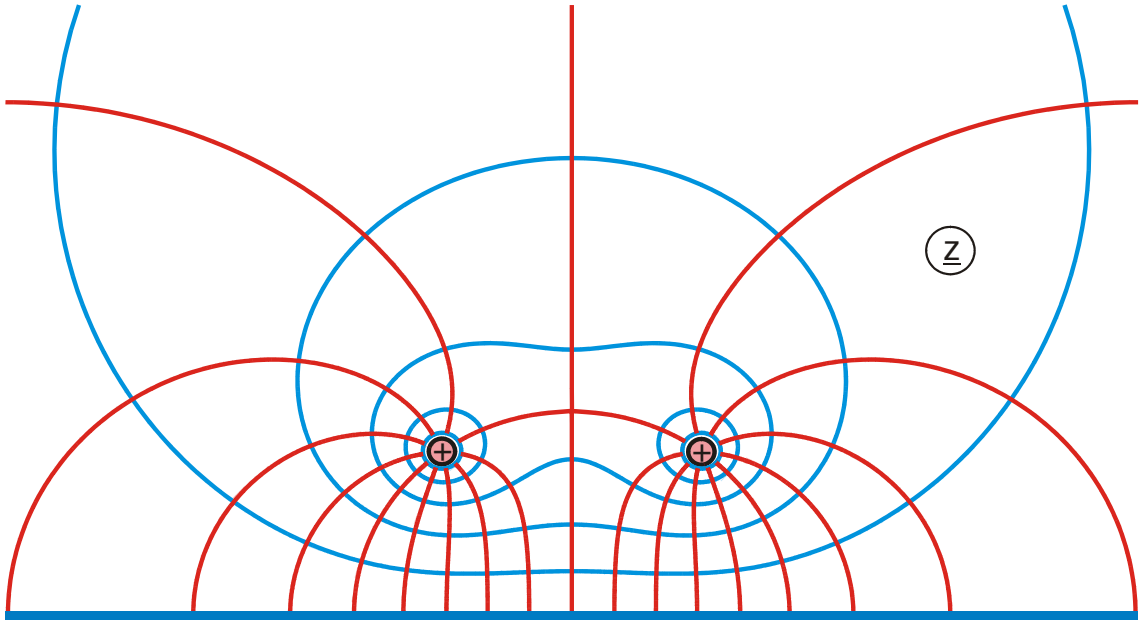
$w_1 = \exp(w\pi)$

$b = 1/\tanh\frac{\ln a}{2}$

$u_B = -\frac{2}{\pi}\ln b$

$-1 \le u \le 0{,}3$

$0 \le v \le 1$



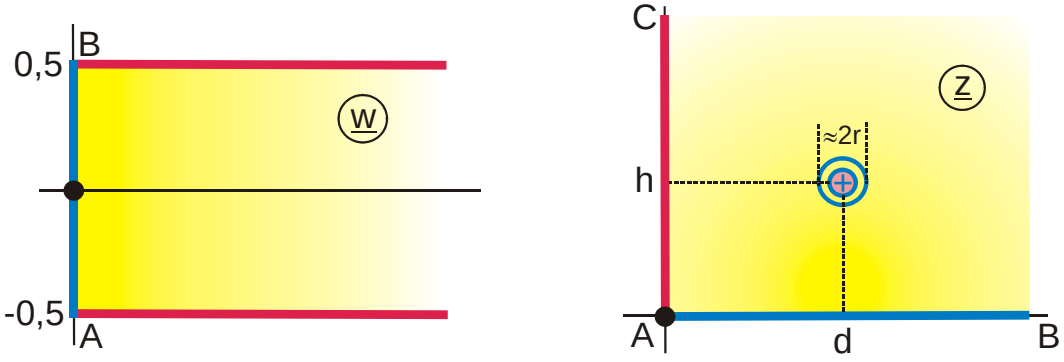


Abbildung L 2

$$z = j\left[\pm\sqrt{h^2\left(w_1{}^2 - 1\right) - d^2} + hw_1\right]$$

$w_1 = \tanh(\pi w)$

$z_1 = h - r + jd$

$$u_E = \frac{1}{2\pi}\ln\frac{\left(z_1 - h\right)^2 + d^2}{\left(z_1 + h\right)^2 + d^2}$$

$0 \le u \le u_E$

$-0{,}5 \le v \le 0{,}5$

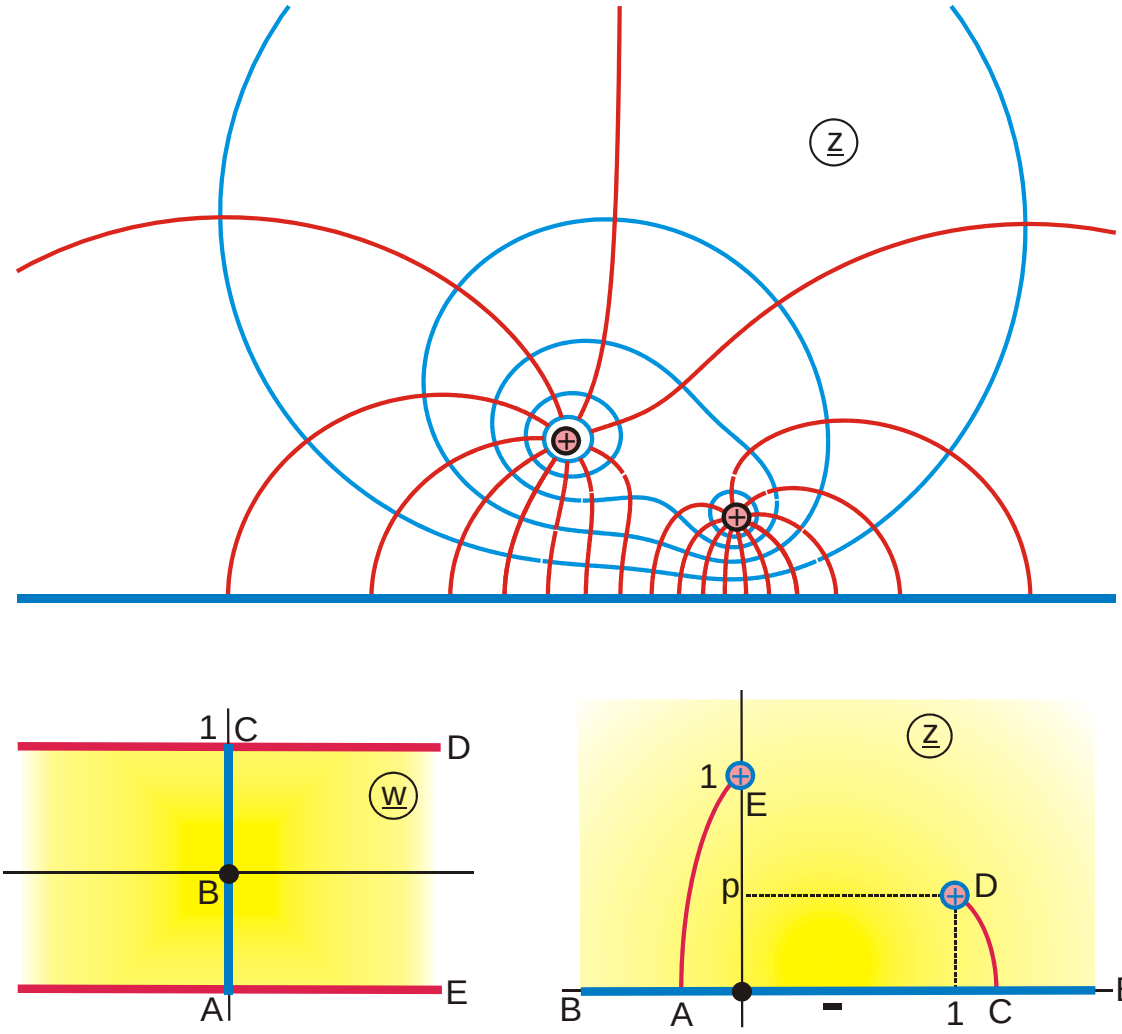


Abbildung L 2.1

$$z = -\frac{b}{2a} \pm \sqrt{\frac{c}{a} + \left(\frac{b}{2a}\right)^2}$$

$a = 1 - w_1$

$b = w_1 - 1 + j(1 + w_1)(1 + p)$

$c = p - w_1 + j\,(1 + w_1)$

$w_1 = \exp(\pi w)$

$-1 \le u \le 1$

$-1 \le v \le 1$

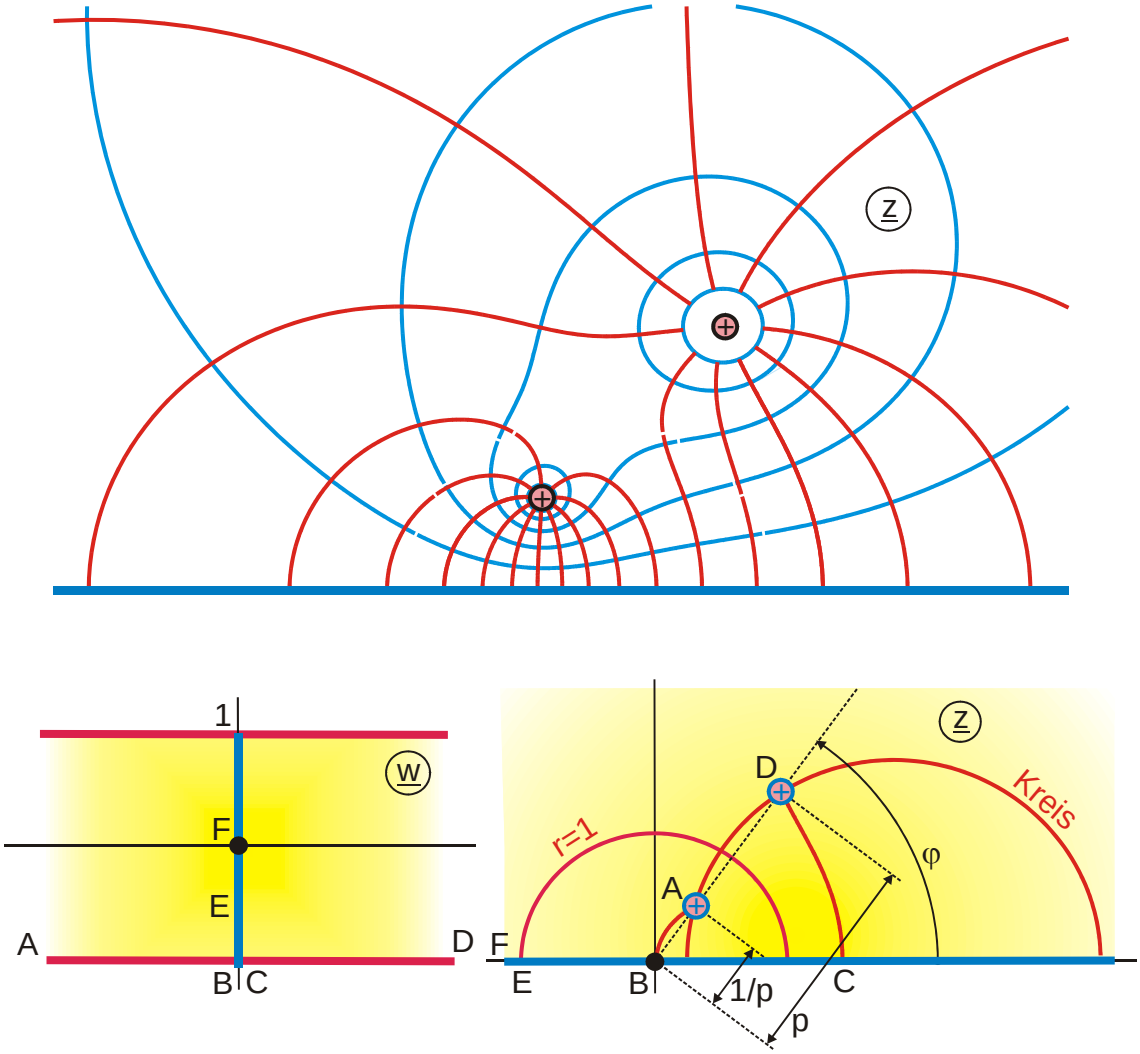


Abbildung L 2.2

$$z = -\frac{b}{2a} \pm \sqrt{\frac{c}{a} + \left(\frac{b}{2a}\right)^2}$$

$a = 1 - w_1$

$b = (p + 1/p)[w_1 \exp(j\varphi)-\exp(-j\varphi)]$

$c = w_1 \exp(j2\varphi)-\exp(-j2\varphi)$

$w_1 = \exp(\pi w)$

$v_E = 2\varphi/\pi$

$-1 \le u \le 1$

$-1 \le v \le 1$

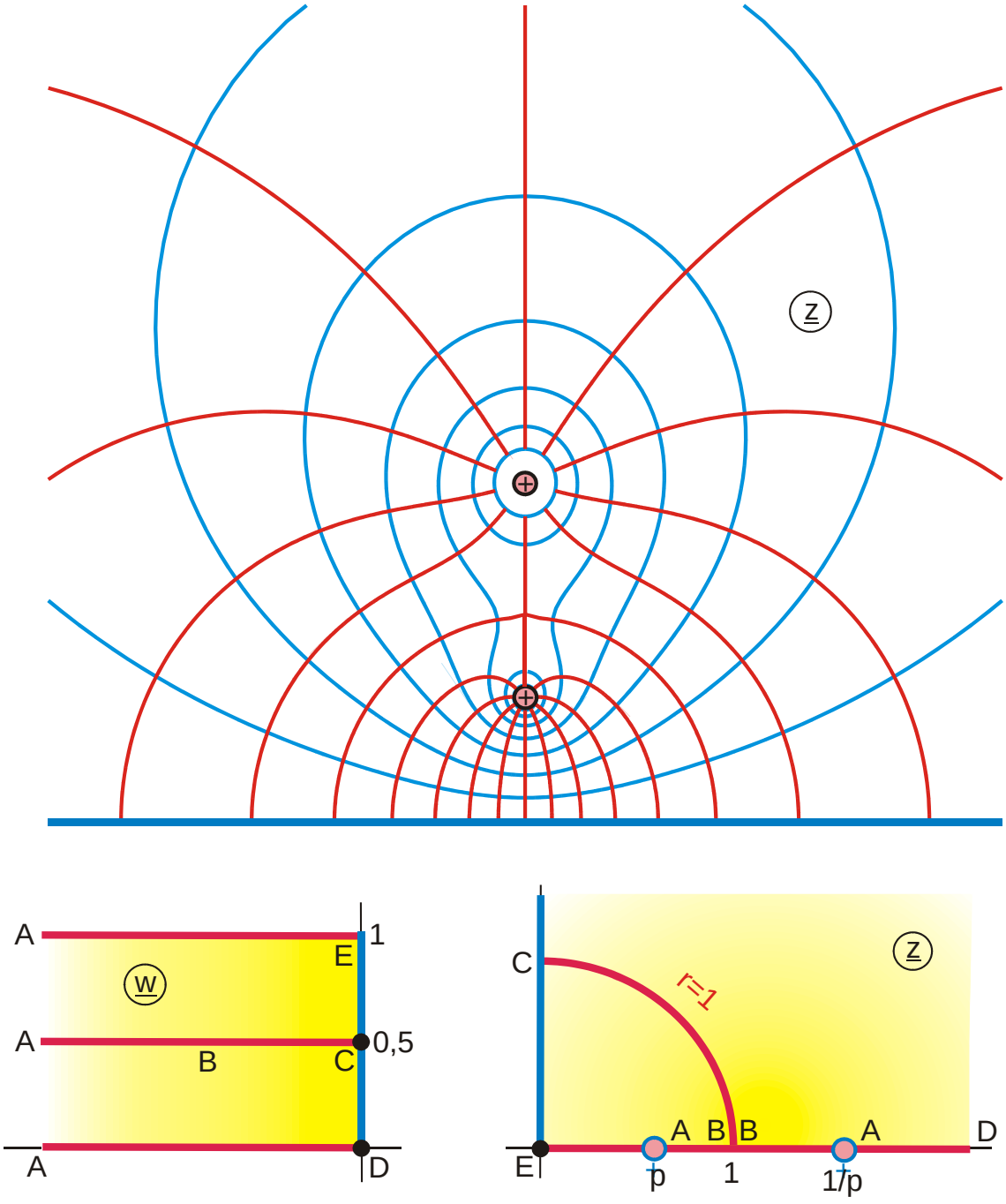


Abbildung L 2.3

$z = \sqrt{d^2 - 1} - d$

$d = (p+1/p)/[2\tanh(\pi w)]$

$-0{,}6 \le u \le 0$ $\qquad$ $0 \le v \le 1$

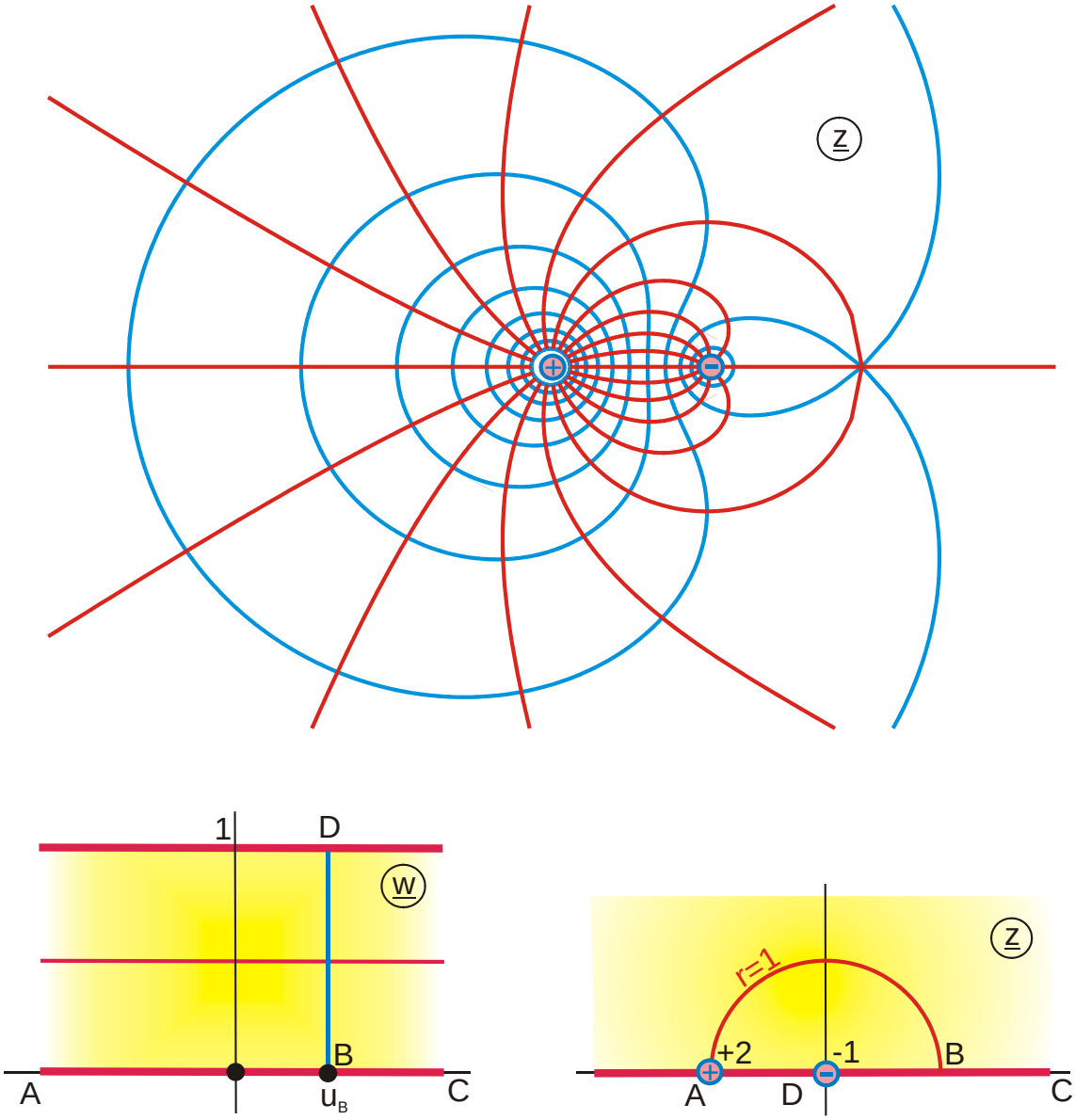


Abbildung L 3

$$z = \frac{\exp(\pi w)}{2}\left[1+\sqrt{1-4\exp(-\pi w)}\right]-1$$

$$u_B = \frac{1}{\pi}\ln 4$$

$-3\,u_B \le u \le 2\,u_B$ $\qquad$ $0 \le v \le 1$

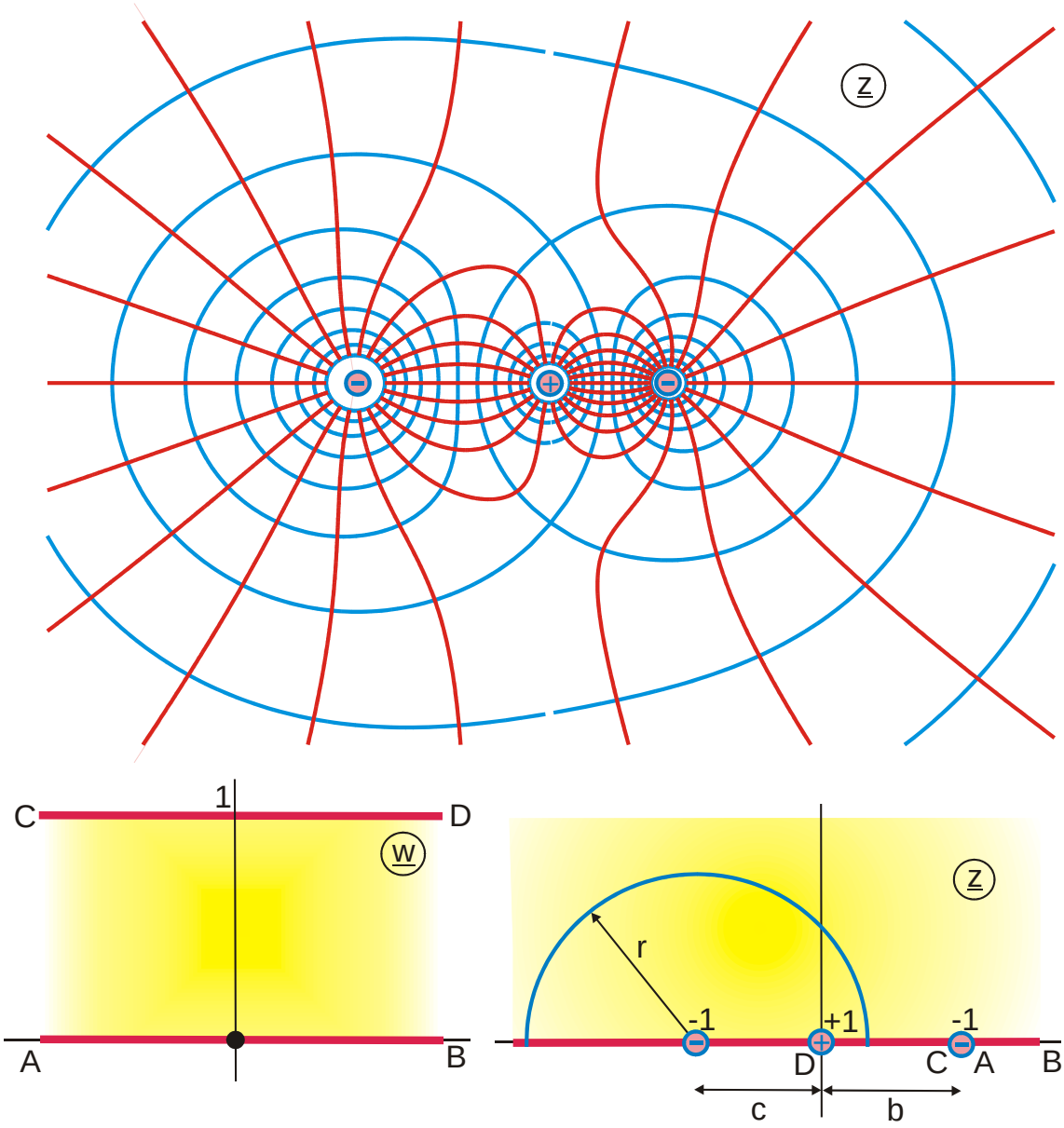


Abbildung L 3.1

$$z = \left[\exp(\pi w) - a/2 \pm \sqrt{\exp(2\pi w) - a\exp(\pi w) + 1} \right] \Big/ \left[1 + a/2 \right]$$

$$a = 2\frac{1-b}{1+b} \qquad c = 1$$

$$r = \sqrt{1+b} \qquad b = 1 \text{ für } a = 0$$

$$-0{,}6 \le u \le 0{,}4 \qquad 0 \le v \le 1$$

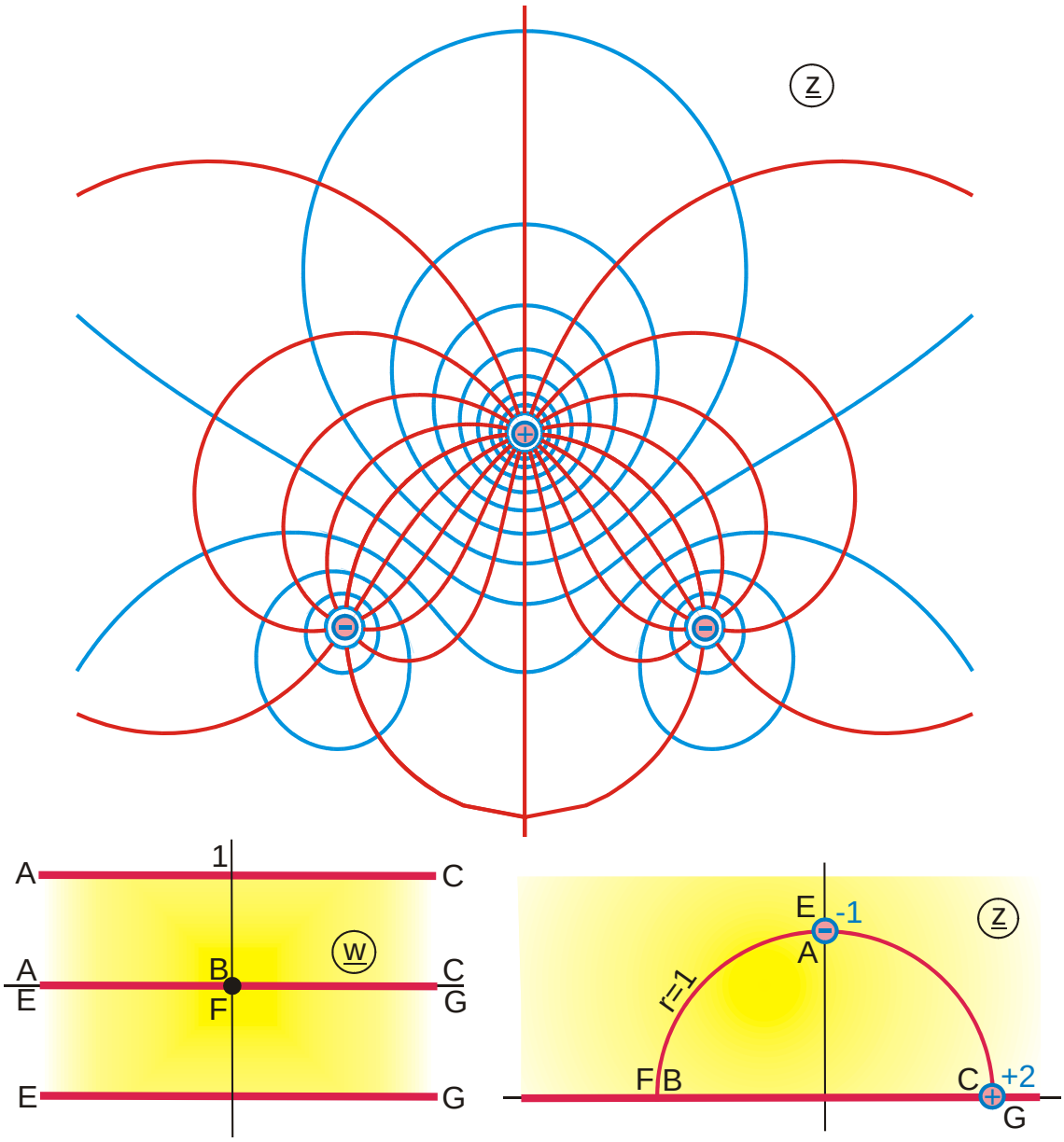


Abbildung L 3.2

$$z = \frac{w_1 - j}{w_1 + j}$$

$$w_1 = j + \frac{1}{\sqrt{1 - \exp(\pi w)}}$$

$-0{,}6 \le u \le 1{,}4$ $\qquad$ $-1 \le v \le 1$

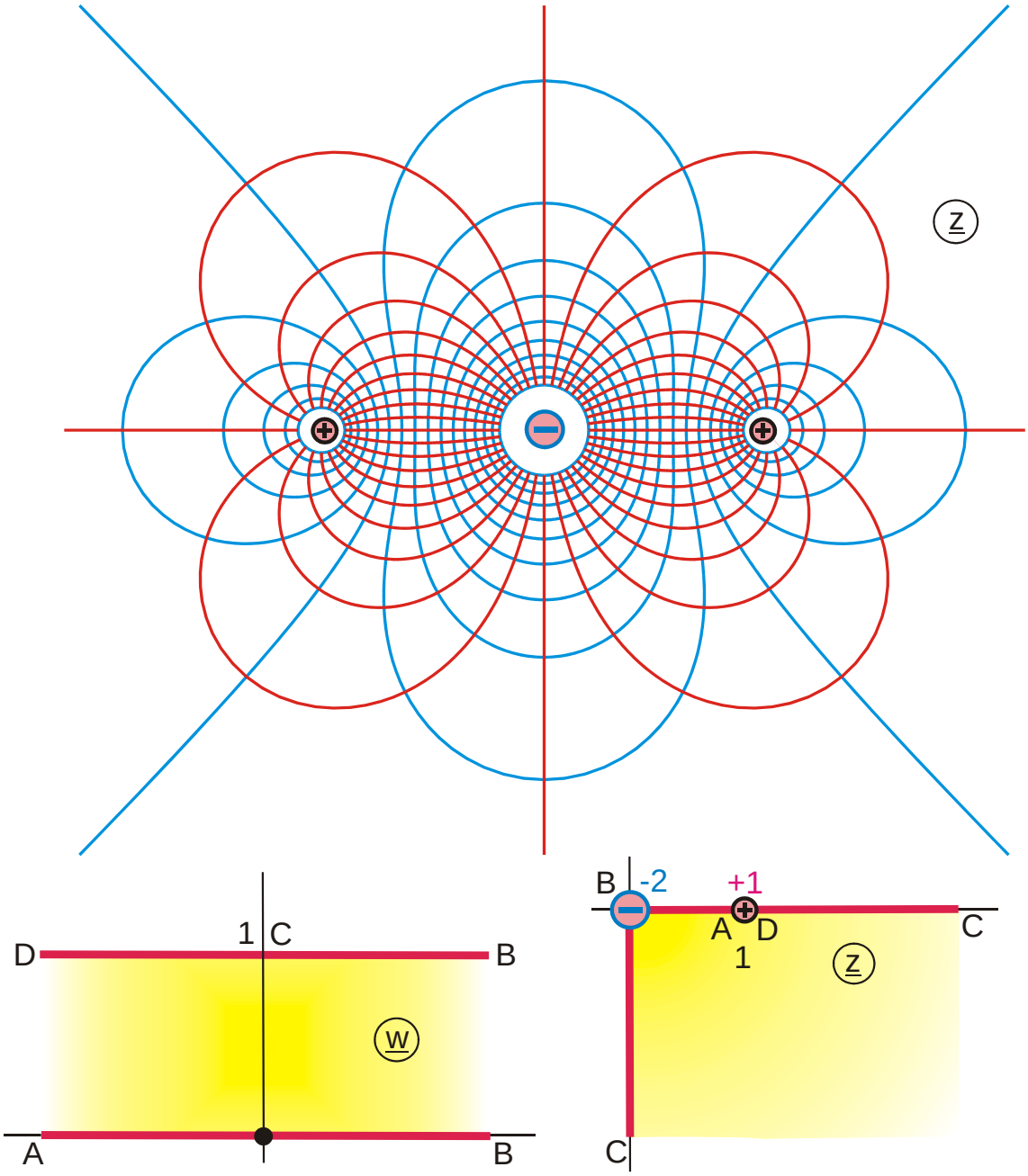


Abbildung L 3.3

$$z = \frac{1}{\sqrt{1 + w_1}}$$

$w_1 = \exp(\pi w)$

$-0{,}5 \le u \le 1$ $\qquad$ $0 \le v \le 1$

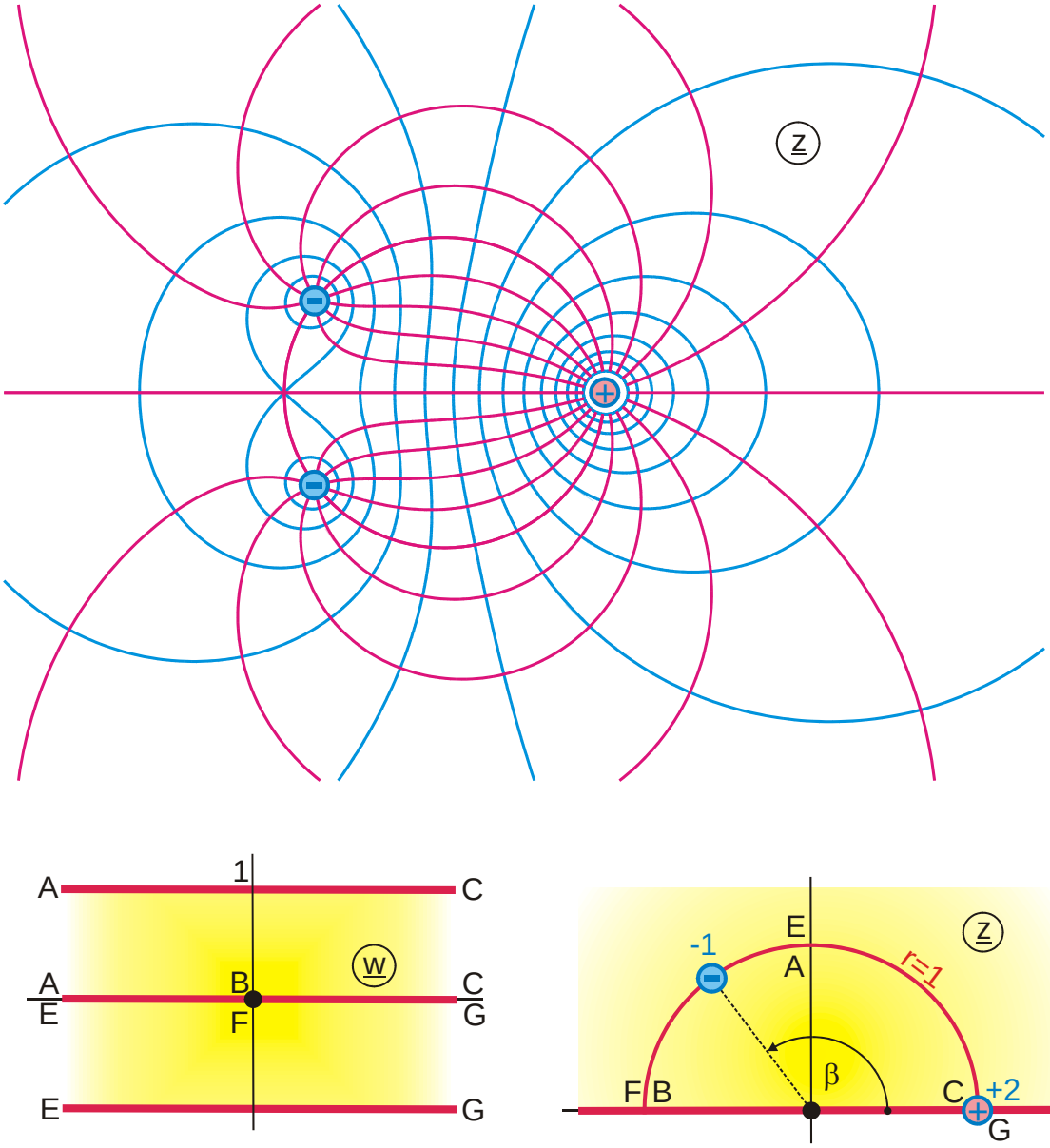


Abbildung L 3.4

$$z = \frac{b + w_2}{1 + b w_2}$$

$$w_2 = \frac{w_1 - j}{w_1 + j}$$

$$w_1 = j + \frac{1}{\sqrt{1 - \exp(\pi w)}}$$

$$b = -\tan\beta - \sqrt{1 + \tan^2\beta}$$

$-0{,}4 \le u \le 2{,}4$

$-1 \le v \le 1$

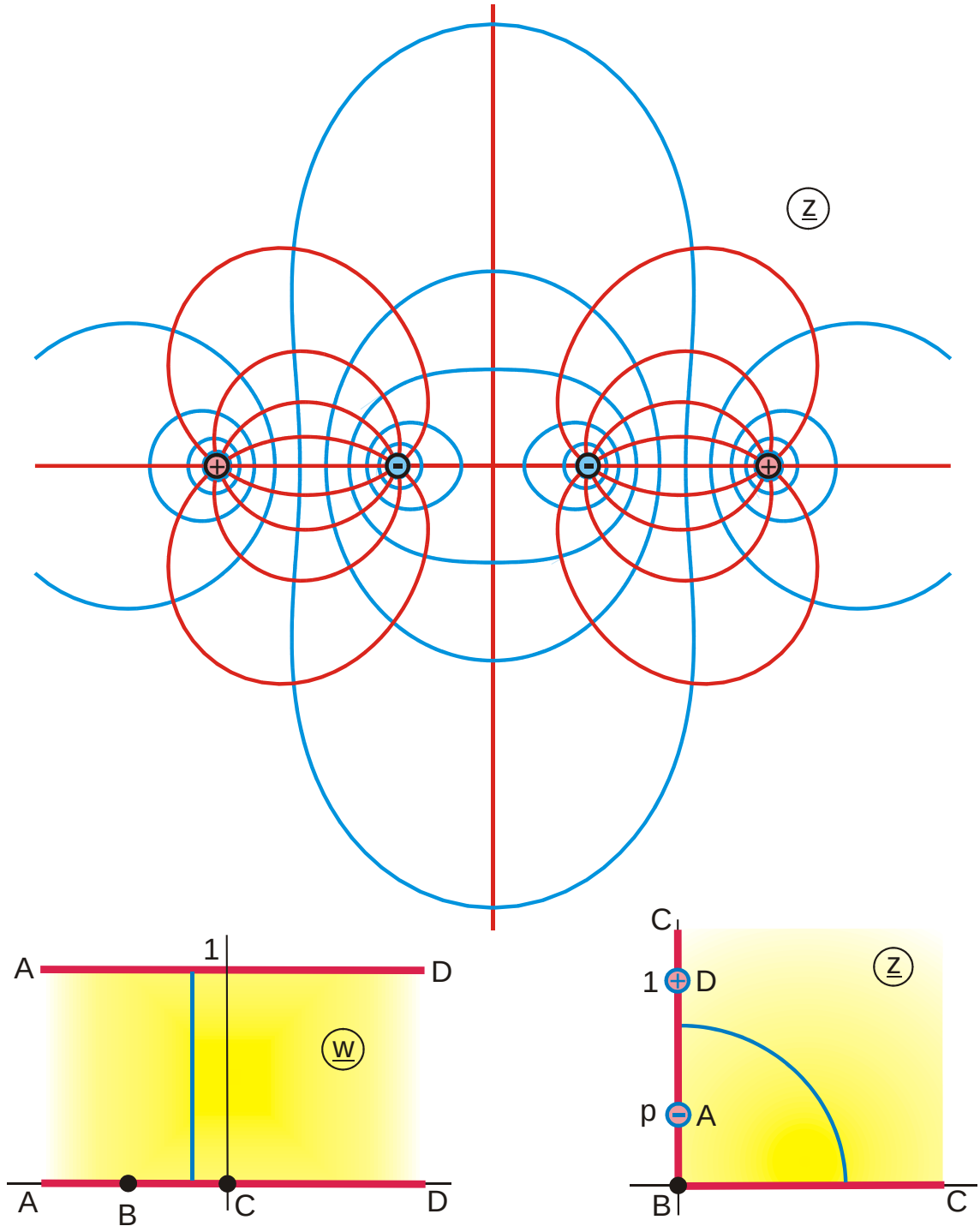


Abbildung L 4

$$z = \sqrt{\frac{\exp(\pi w) - p^2}{1 - \exp(\pi w)}}$$

$$u_B = \frac{2}{\pi} \ln p$$

$-1{,}2 \le u \le 0{,}8$ $\qquad$ $0 \le v \le 1$

Abbildungen Gruppe M

Abbildungen mit abgerundeten Ecken

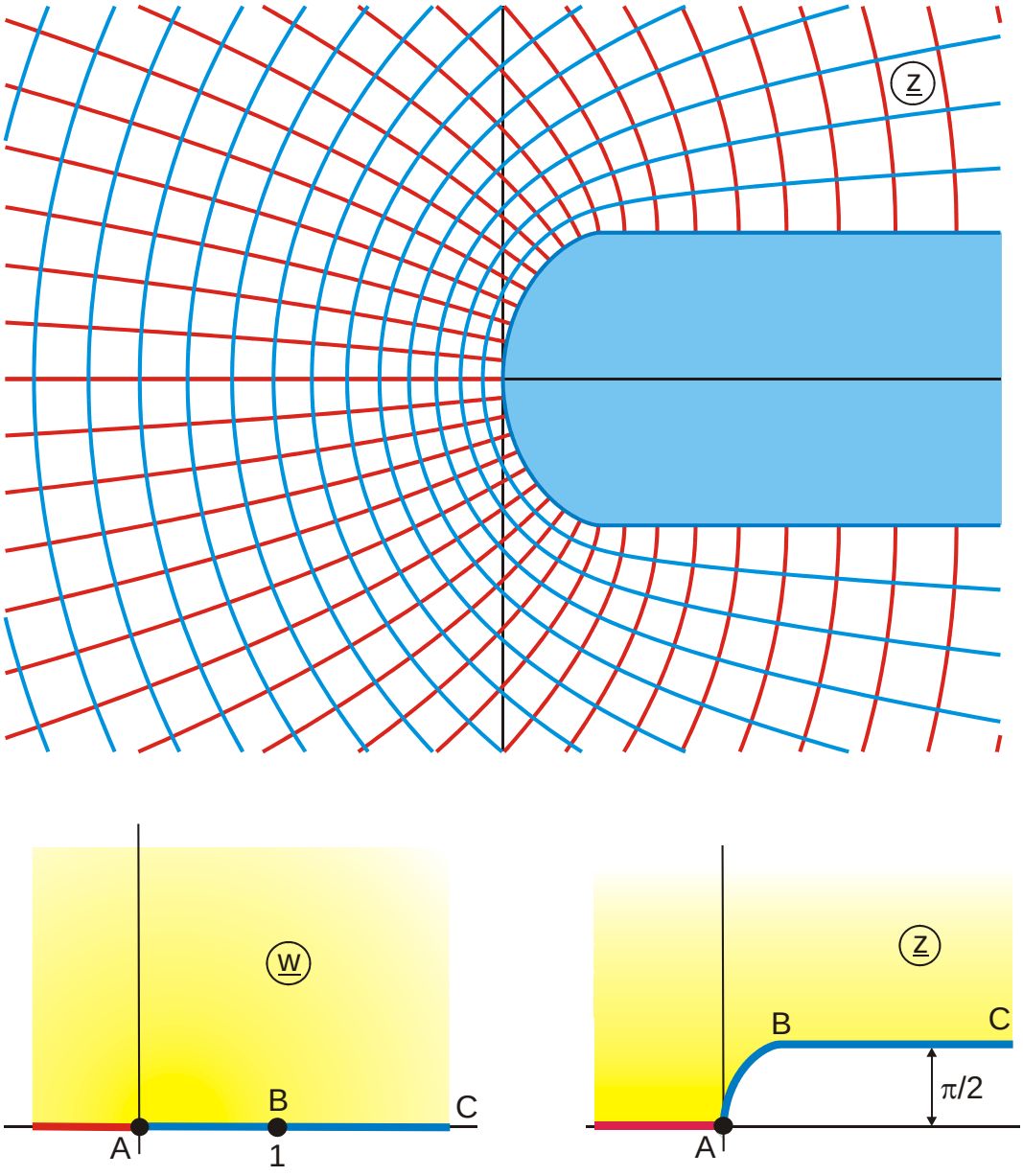


Abbildung M 1

$$z = w\sqrt{w^2 - 1} - \operatorname{ar}\cosh w + j\frac{\pi}{2} + (\sigma w)^2$$

Abnehmender Krümmungsradius mit zunehmendem σ.

Vertikale Tangente bei A, Knick bei B. $\sigma = 1$

$0 \le u \le 2$ $0 \le v \le 1{,}5$

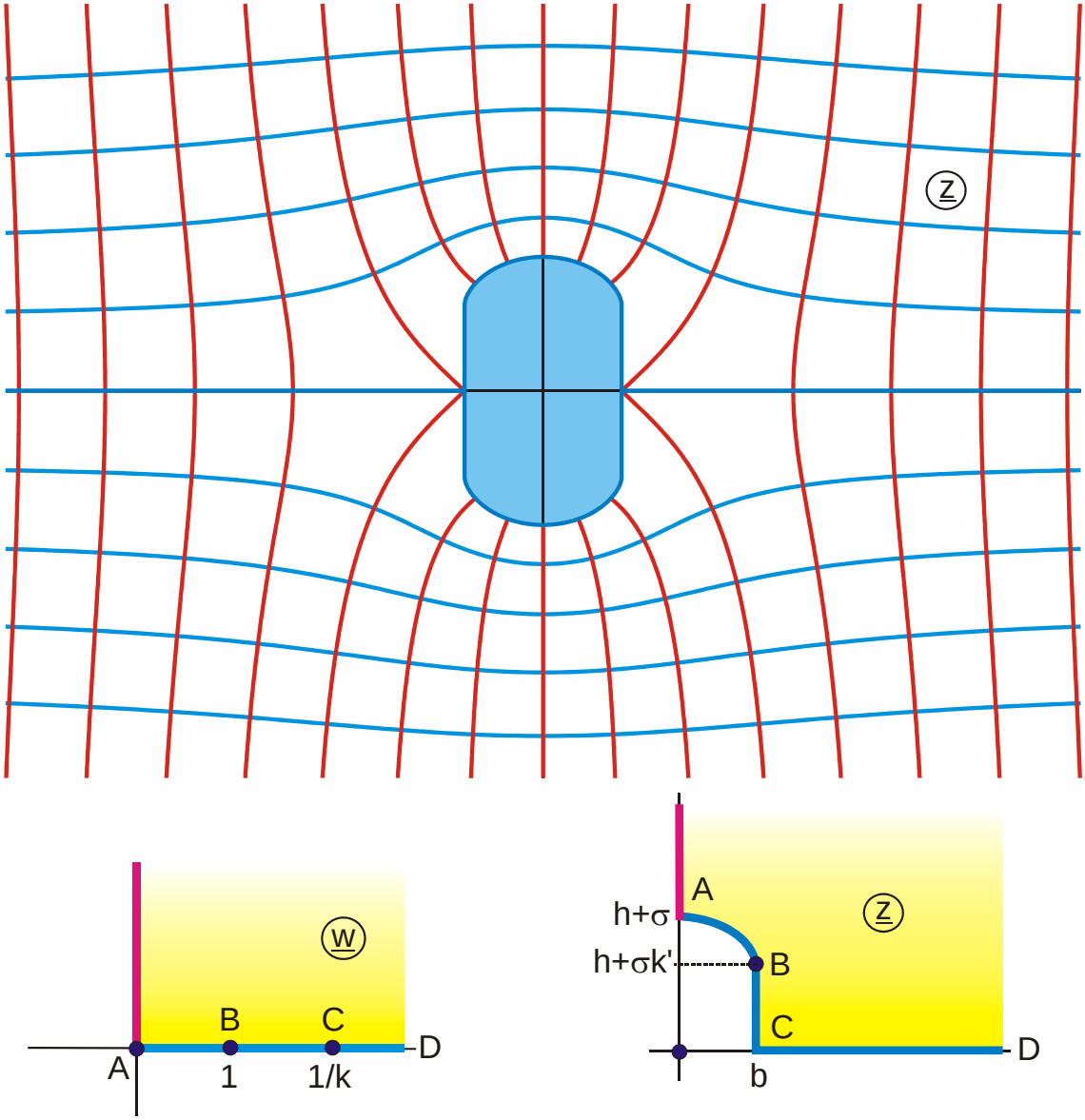


Abbildung M 1.1

$$z = B_a(w,k) + jh + \sigma\sqrt{(kw)^2 - 1}$$

gegeben: k, σ

k = 1/1,2

$0 \le u \le 4$

$$b = \frac{E(k) - k'^2\,K(k)}{k^2}$$

halbkreisähnlich für σ = b/(1-k')

σ = 1,25

$0 \le v \le 2$

$$h = \frac{E'(k)}{k^2} - K'(k)$$

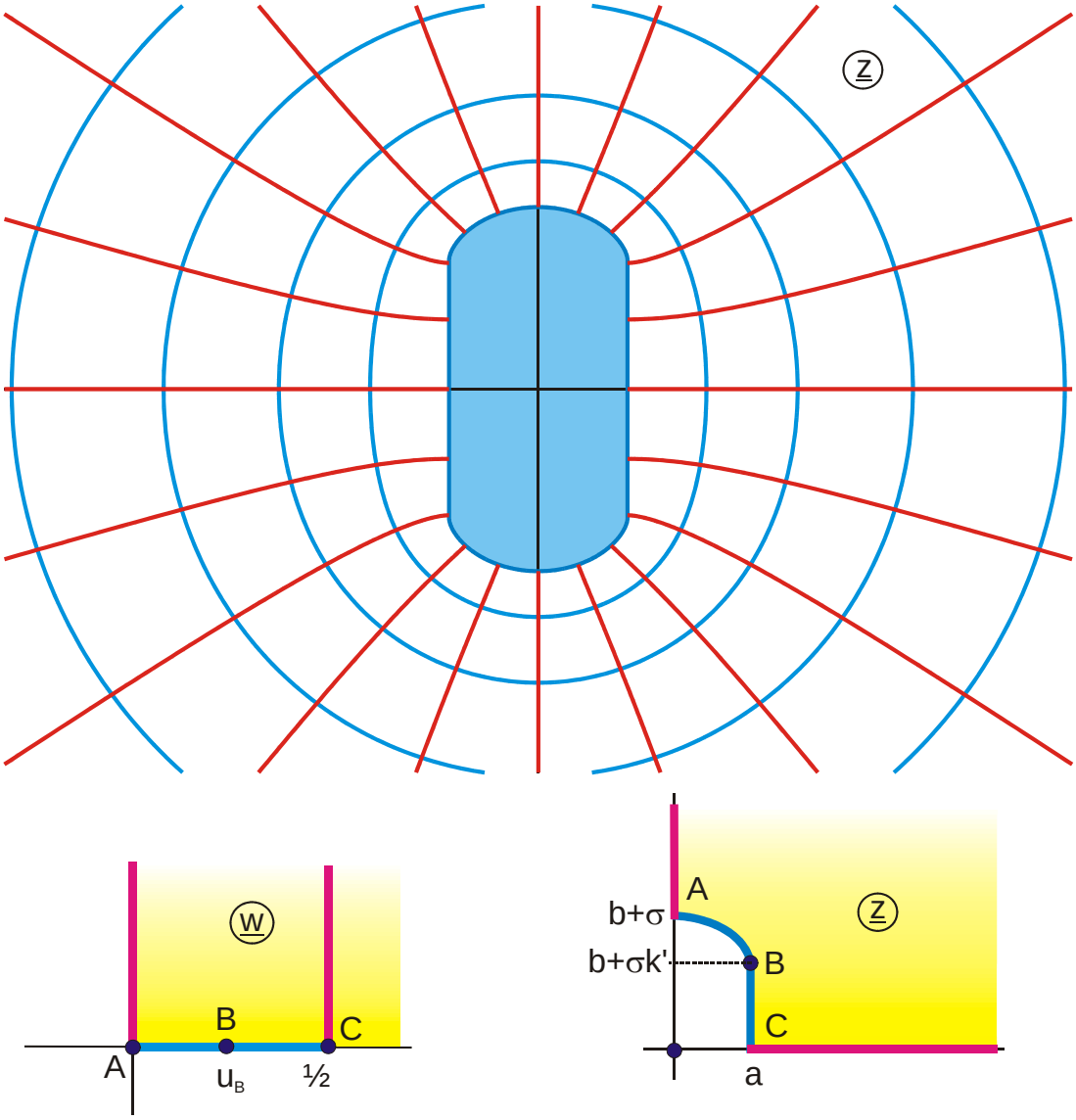


Abbildung M 1.2

$$z = B_a\left(\frac{\sin(w\pi)}{k}, k\right) + jb + j\sigma\cos(w\pi)$$

gegeben: k, σ

halbkreisähnlich für σ = a/(1-k')

k = 0,79 σ = 1,4

0 ≤ u ≤ 0,5 0 ≤ v ≤ 0,5

$$a = \frac{E(k) - k'^2\,K(k)}{k^2} \qquad b = \frac{E'(k)}{k^2} - K'(k)$$

u_B = (arcsin k)/π

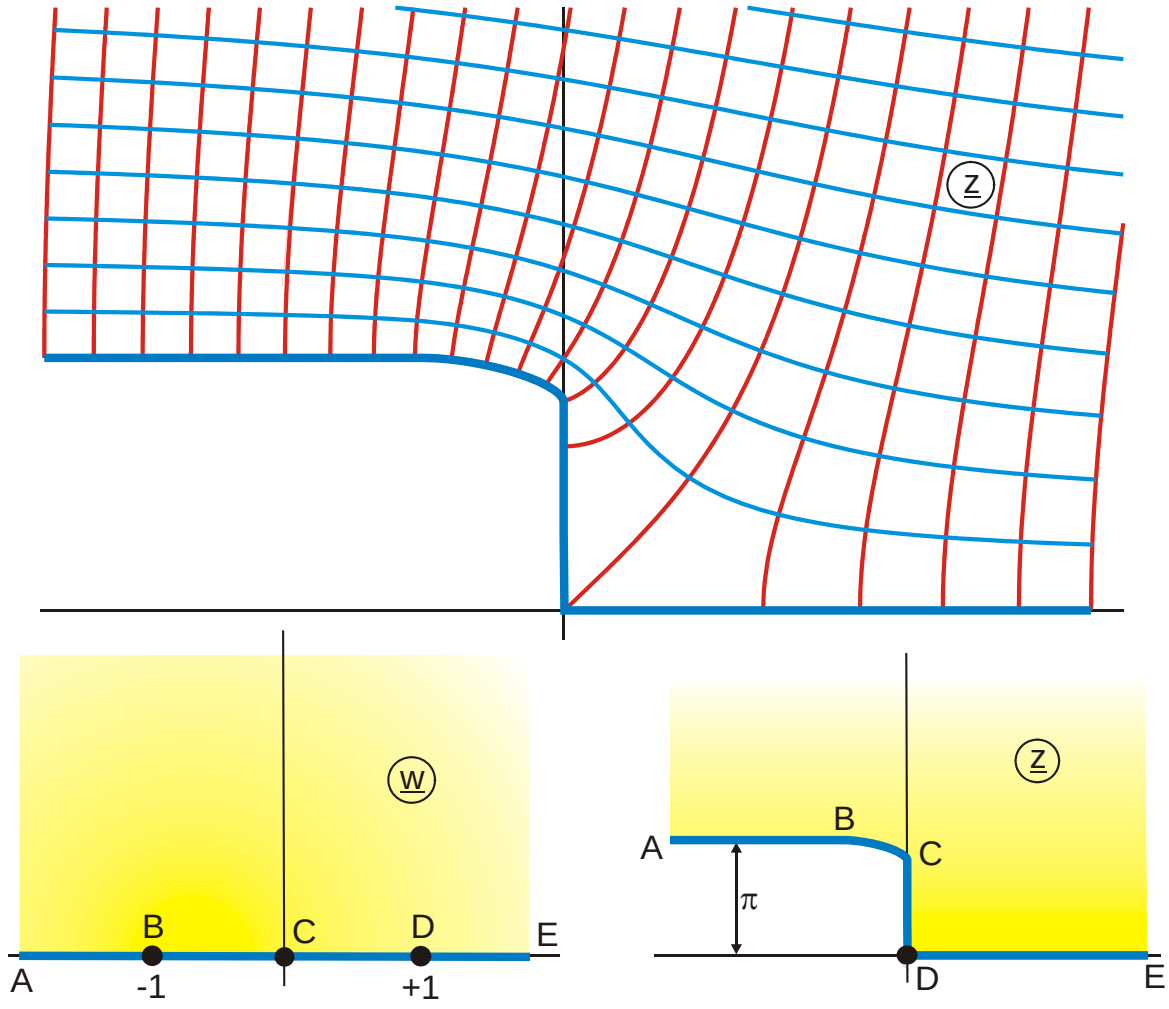


Abbildung M 2

$z = f(w_1) + f(w_2)$

$f(w) = \operatorname{ar\,cosh} w + \sqrt{w^2 - 1}$

$w_1 = w + 1$

$w_2 = \sigma w + 1$

$-15 \le u \le 5$

$0 \le v \le 10$

$0 < \sigma \le 1$

$\sigma = 0{,}3$

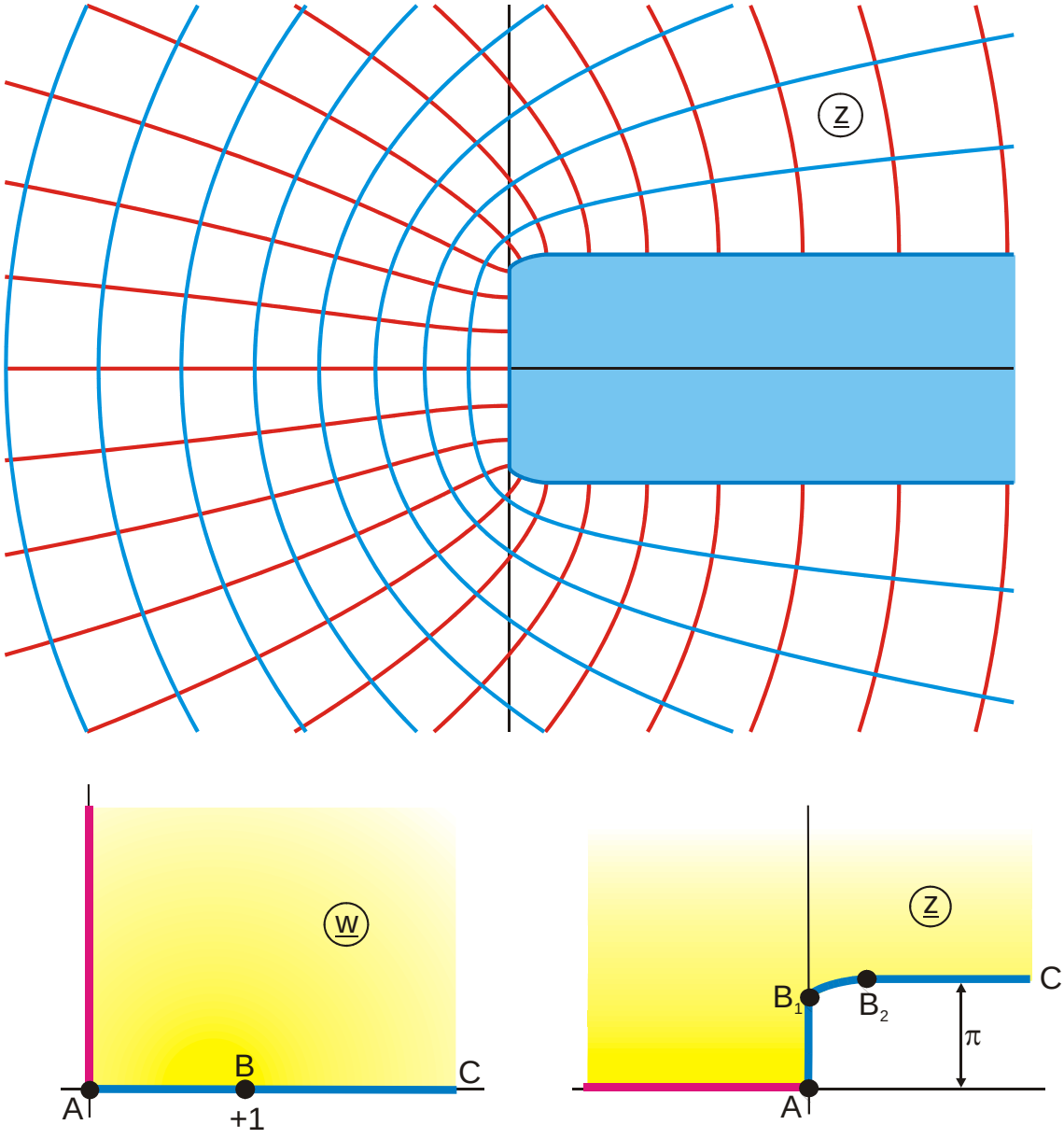


Abbildung M 2.1

$z = f(w_1) + f(w_2)$

$f(w) = w\sqrt{w^2 - 1} - \operatorname{ar\,cosh} w + j\frac{\pi}{2}$

$w_1 = w$

$w_2 = \sigma w$

$0 \le u \le 2$

$0 \le v \le 2$

$\sigma = 1{,}6$

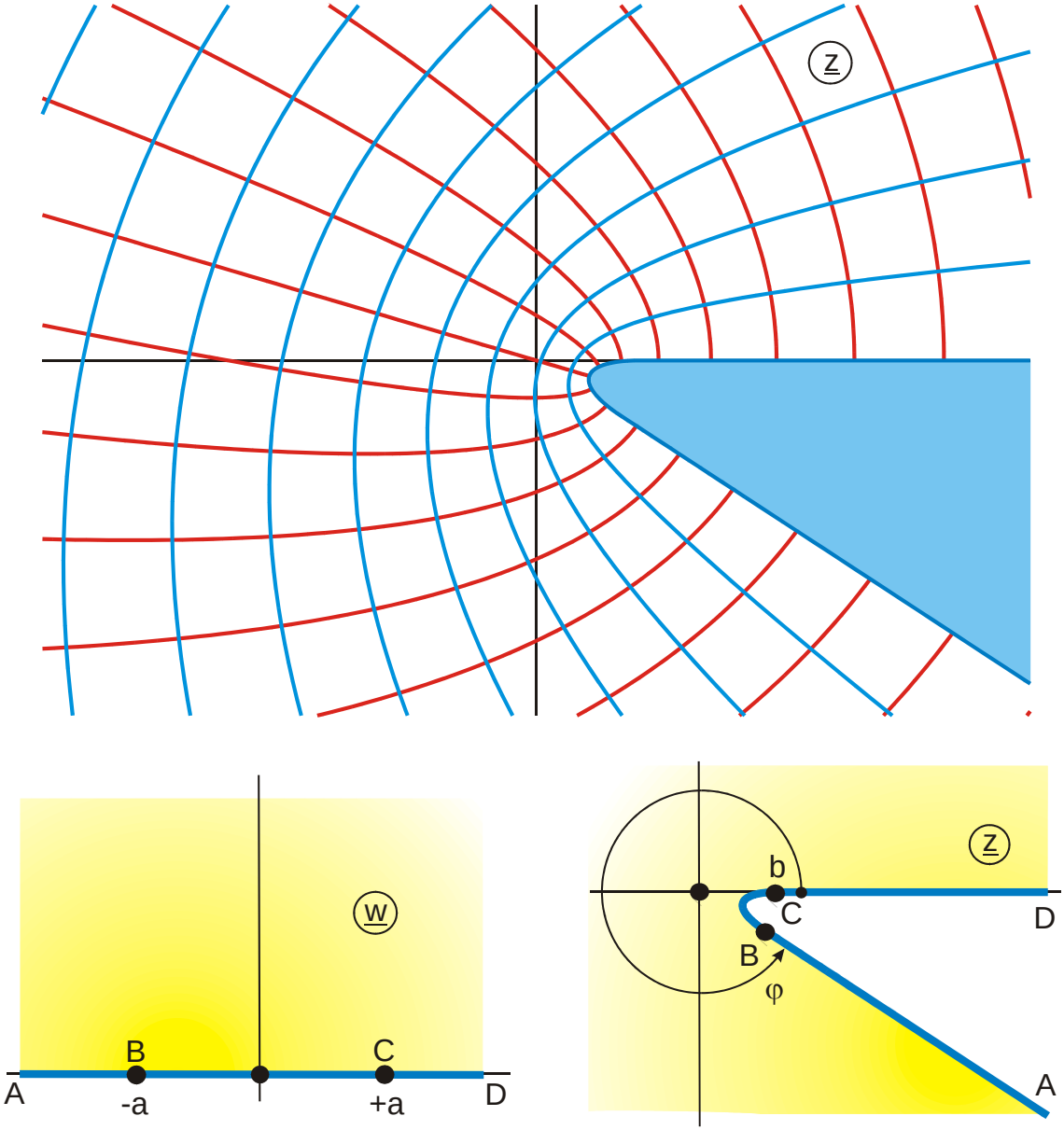


Abbildung M 2.2

$z = f(w_1) + f(w_2)$ $\qquad f(w) = w^{\varphi/\pi}$

$w_1 = w - a$ $\qquad w_2 = w + a$

$-1{,}6 \le u \le 1{,}6$ $\qquad 0 \le v \le 1{,}6$

$\varphi = 325°$

gegeben: a, φ

$b = (2a)^{\varphi/\pi}$

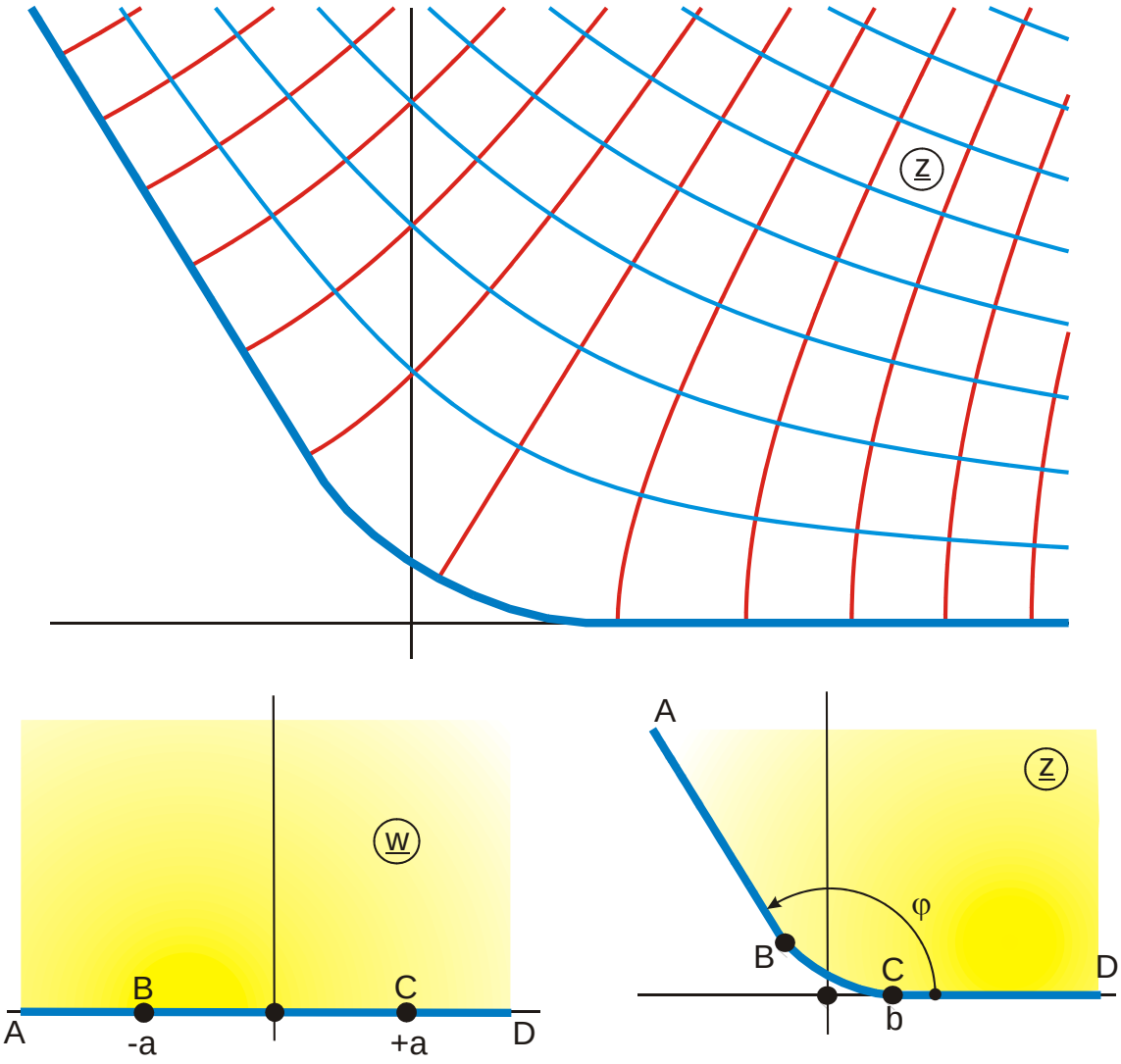


Abbildung M 2.3

$z = f(w_1) + f(w_2)$

$f(w) = w^{1+\varphi/\pi}$

$w_1 = w - a$

$w_2 = w + a$

$-5 \le u \le 5$

$0 \le v \le 5$

$\varphi = 120°$

gegeben: a, φ

$b = (2a)^{\varphi/\pi}$

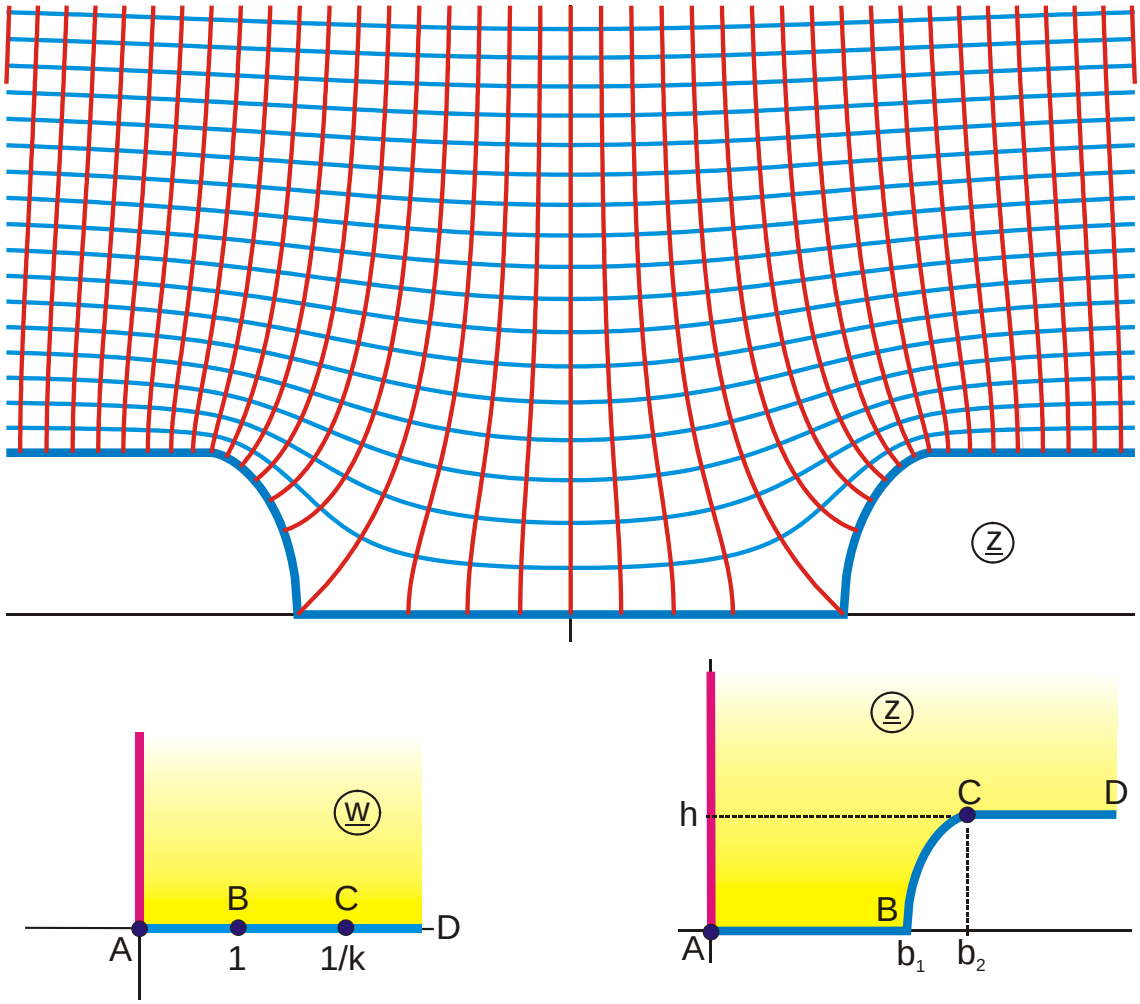


Abbildung M 3

$z = E_a(w,k) + \sigma w$

$b_1 = E + \sigma$ $\qquad$ $b_2 = E + \sigma / k$

$h = K'(k) - E'(k)$

$0 \le u \le 5$ $\qquad$ $0 \le v \le 2{,}5$

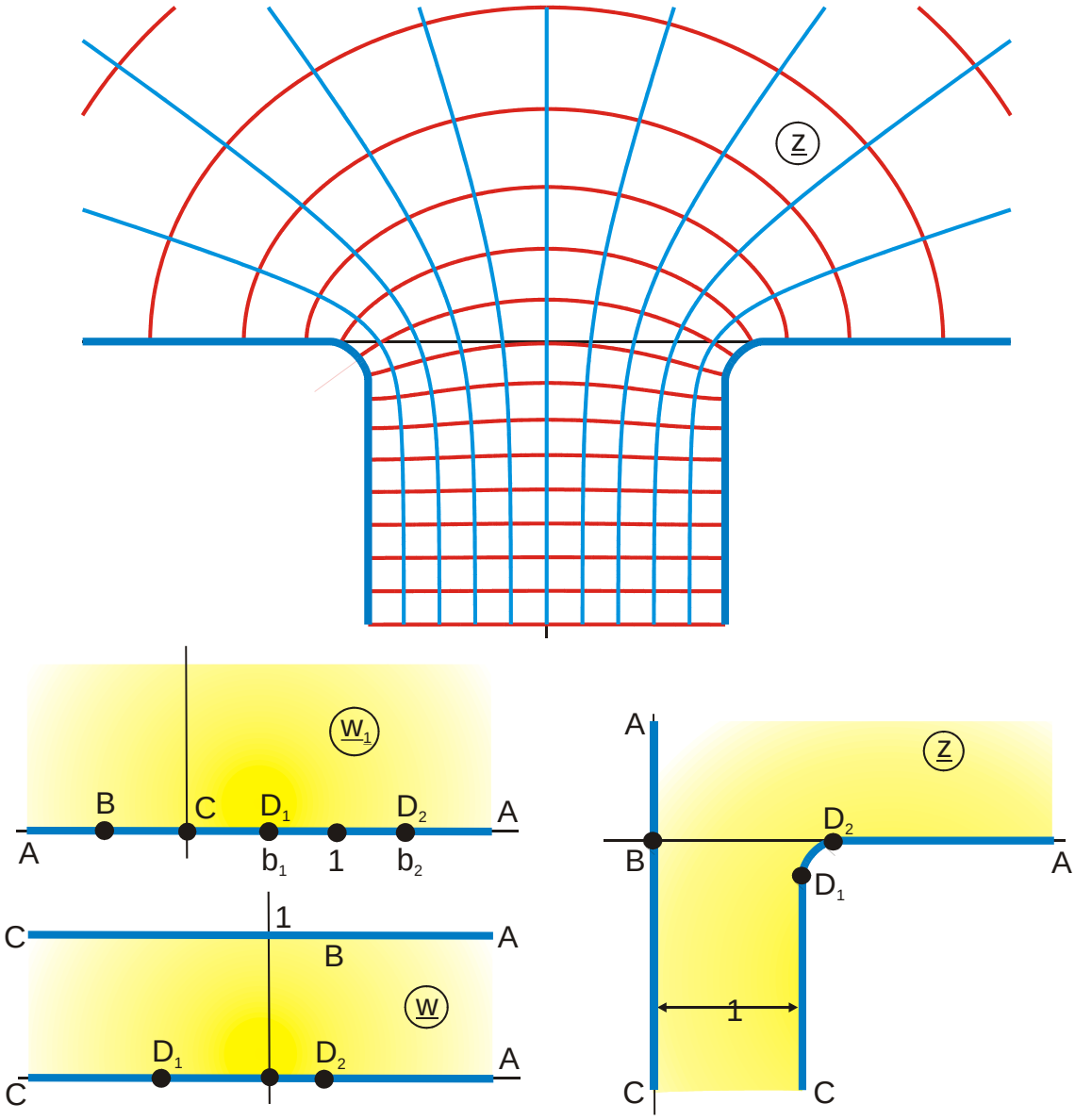


Abbildung M 4

$$z = f(w_1, b_1) + \lambda\, f(w_1, b_2) + 1$$

$$f(w,b) = \frac{2}{\pi\left(\sqrt{b_1} + \lambda\sqrt{b_2}\right)}\left\{\sqrt{w-b} - \sqrt{b}\arctan\sqrt{\frac{w-b}{b}}\right\}$$

$$w_1 = \exp(\pi w)$$

$-2 \le u \le 1$ $\qquad$ $0 \le v \le 1$

gegeben: b_1, b_2, λ

$b_1 = 0{,}25$ $\qquad$ $b_2 = 1{,}25$ $\qquad$ $\lambda = 0{,}8$

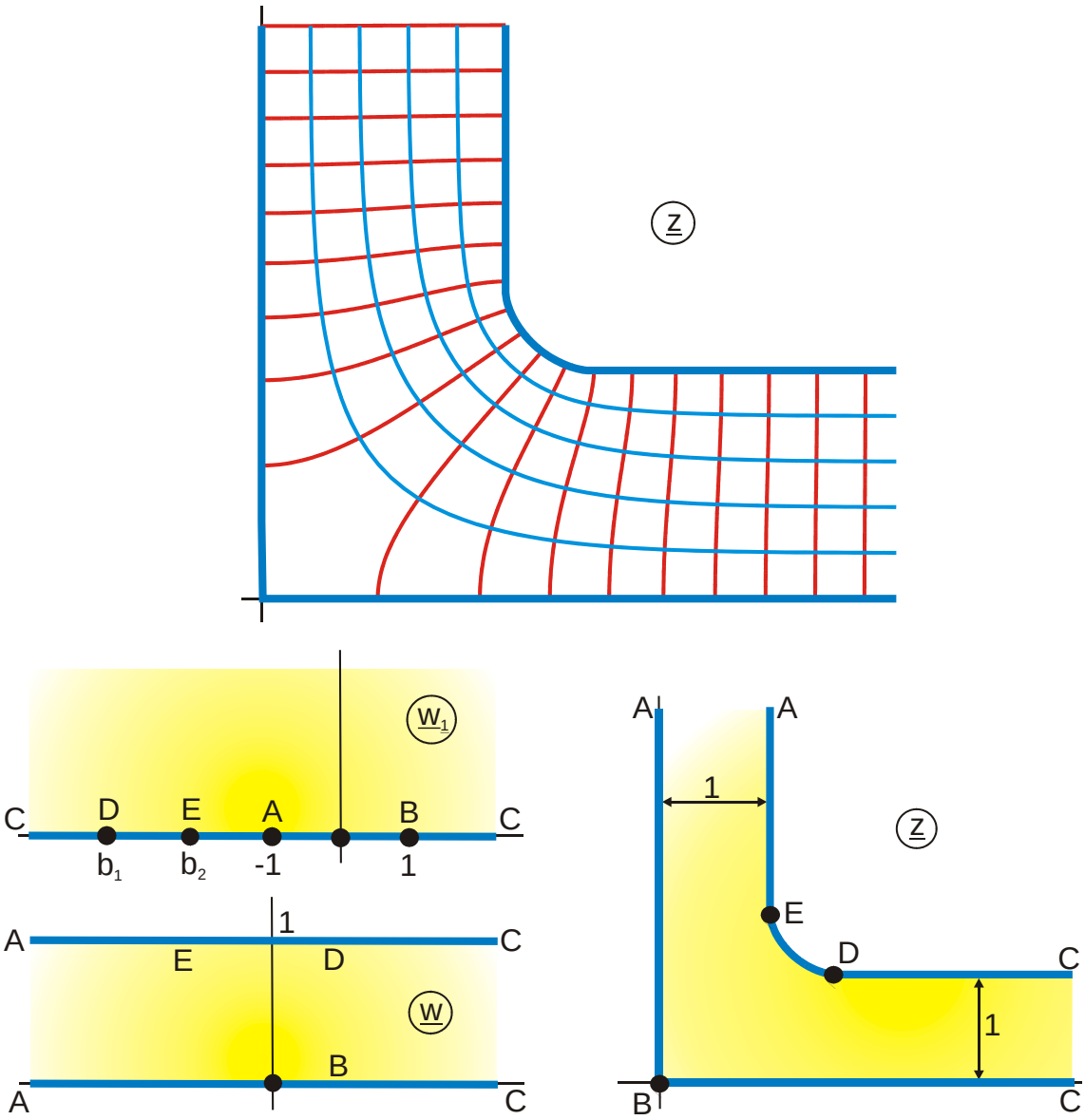


Abbildung M 4.1

$$z = \frac{1}{\pi(1+\lambda)}\left\{f_1(w_1,b_1) + \lambda\, f_2(w_1,b_2)\right\}$$

$$f(w,b) = \sqrt{\frac{b+1}{2}}\ln\frac{\sqrt{2(w-b)}-\sqrt{(w-1)(w+b)}}{\sqrt{2(w-b)}+\sqrt{(w-1)(w+b)}} + \ln\frac{\sqrt{w-b}+\sqrt{w-1}}{\sqrt{w-b}-\sqrt{w-1}}$$

$$w_1 = \exp(\pi w) - 1 \qquad \lambda = \frac{\sqrt{-b_1-1}-\sqrt{2}}{\sqrt{2}-\sqrt{-b_2-1}}$$

$$-1{,}5 \le u \le 2{,}5 \qquad 0 \le v \le 1$$

gegeben: b_1, b_2, λ mit $b_1, b_2 < 0$

$b_1 = -9$ $\qquad b_2 = -1{,}5$ $\qquad \lambda = 2$

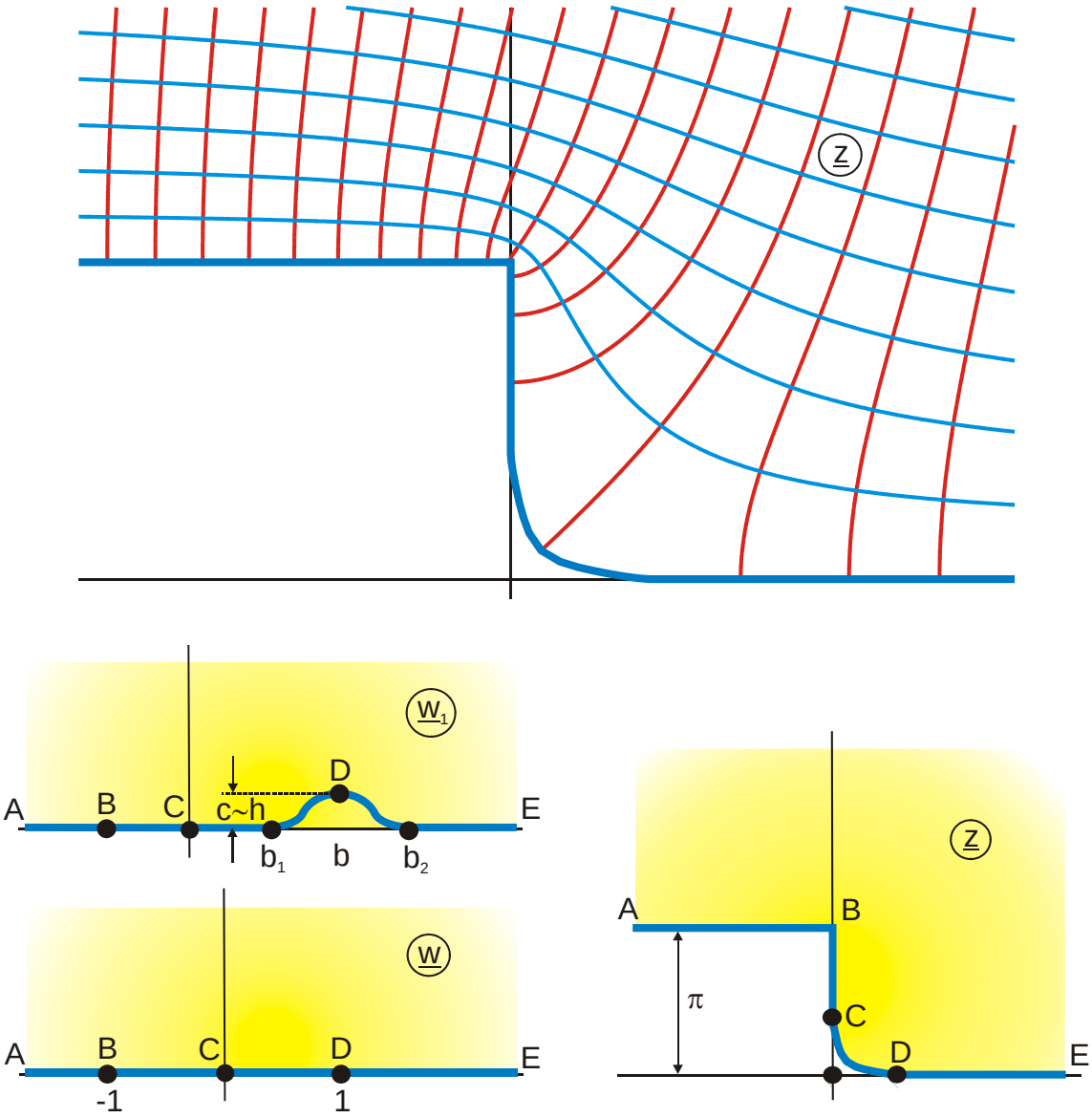


Abbildung M 5

$$z = \ln\left(w_1 + \sqrt{w_1^2 - 1}\right) + \sqrt{w_1^2 - 1}$$

$$w_1 = w - \frac{h}{a^2}\left\{\left[(w - b_1)(w - b_2)\right]^{3/2} - (w - b_1)(w - b_2)(w - b)\right\}$$

gegeben: a, h

$b = 1$

$b_1 = b - a$ $\qquad\qquad$ $b_2 = b + a$

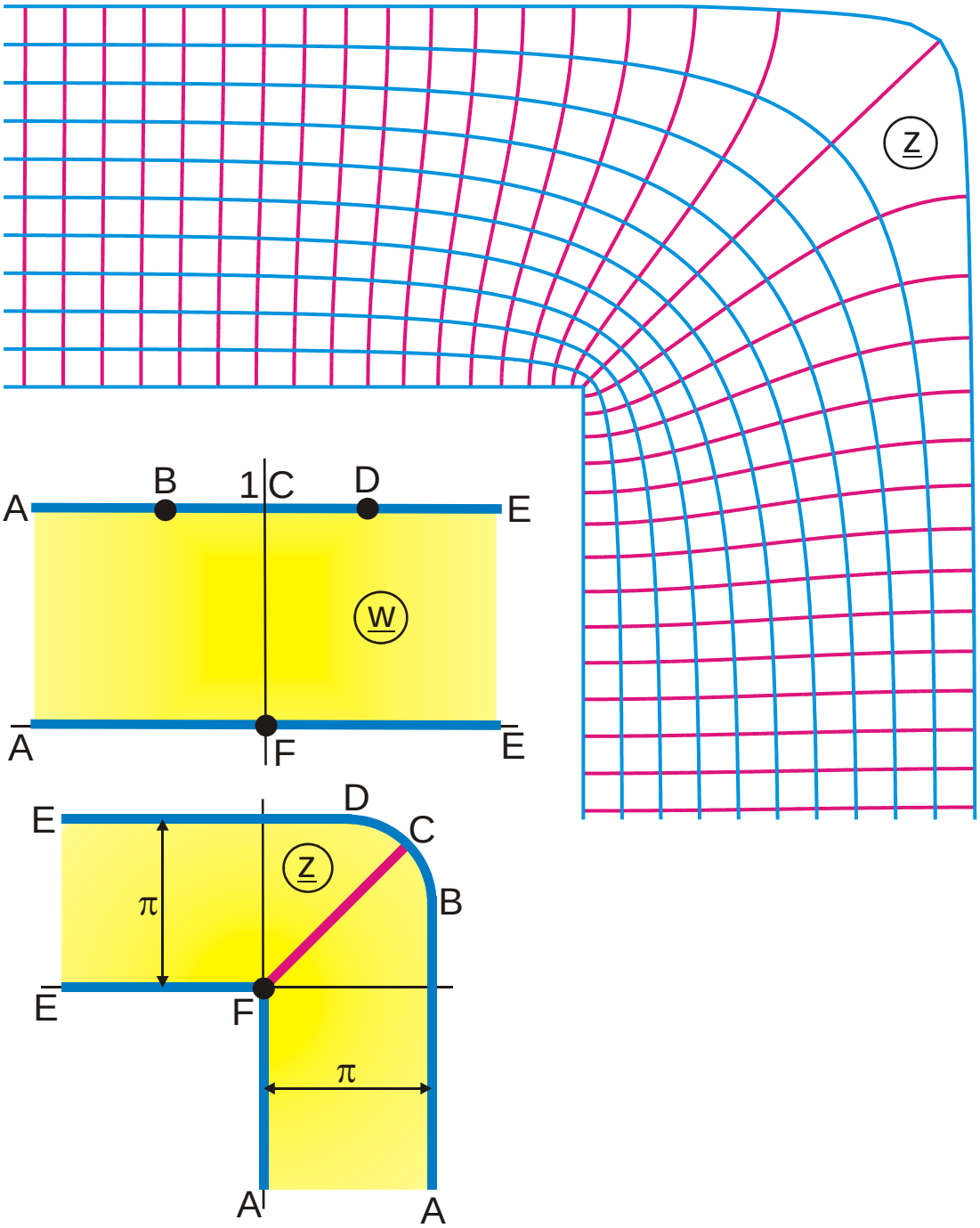


Abbildung M 5.1

$$z = 2\arctan w_3 - \ln\frac{w_3+1}{w_3-1} + j\pi \qquad w_3 = \sqrt{\frac{w_2+1}{w_2-1}}$$

$$w_2 = w_1 - \frac{h}{a^2}\left\{\left[(w_1-b_1)(w_1-b_2)\right]^{3/2} - (w_1-b_1)(w_1-b_2)(w_1-b)\right\} - \Delta \qquad w_1 = \exp(w\pi)$$

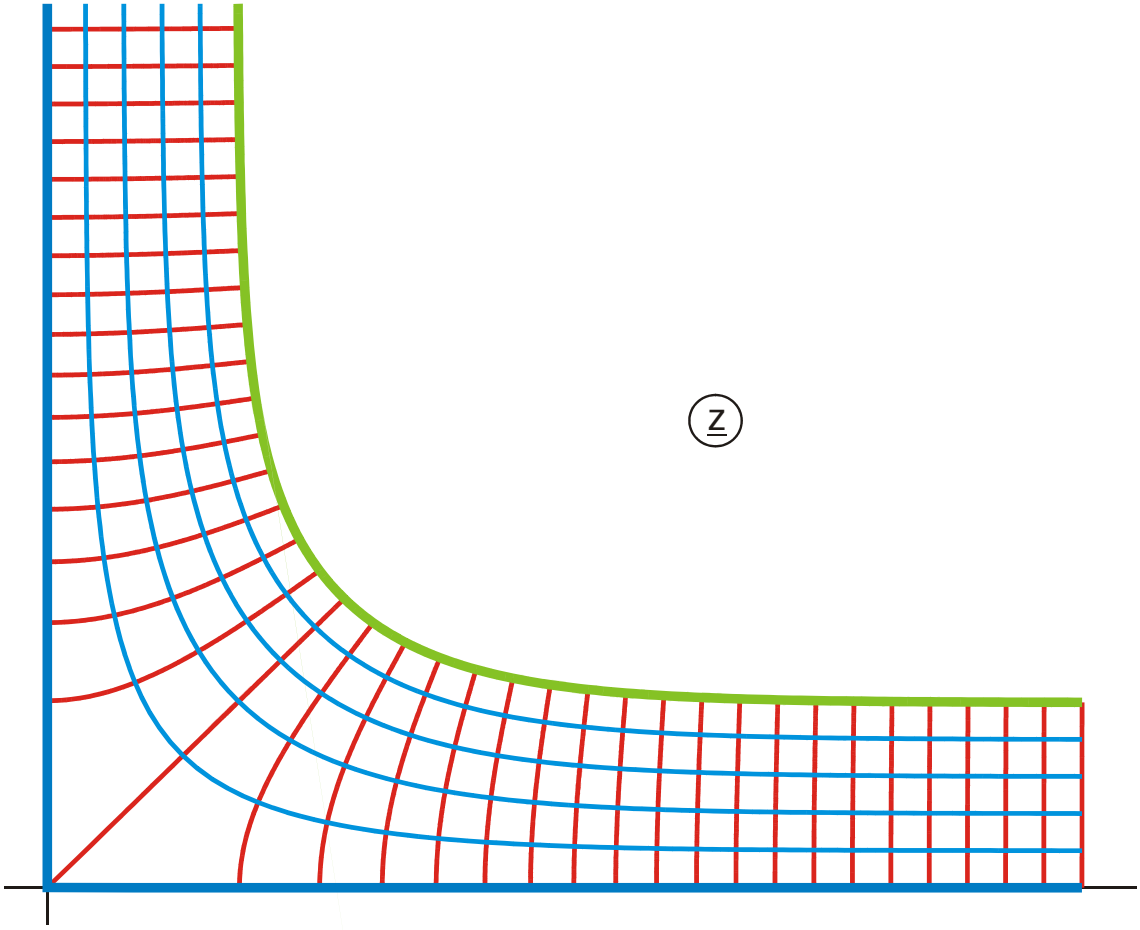
gegeben: a, h $\qquad b = 1 \qquad b_1 = b - a \qquad b_2 = b + a$

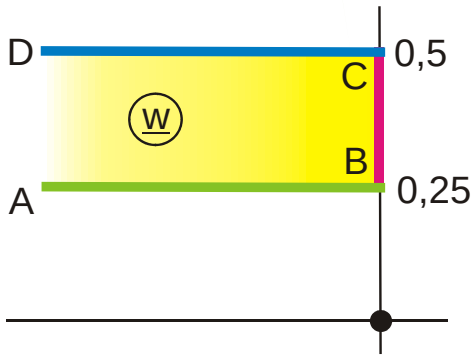
$$\Delta = g - \frac{h}{a^2}\left\{\left[(g-b_1)(g-b_2)\right]^{3/2} - (g-b_1)(g-b_2)(g-b)\right\} \text{ mit } g = \exp(-100)$$

$-2 \le u \le 2 \qquad 0 \le v \le 1$

Abbildungen Gruppe N

Leitende Elektroden mit konstanter Feldstärke





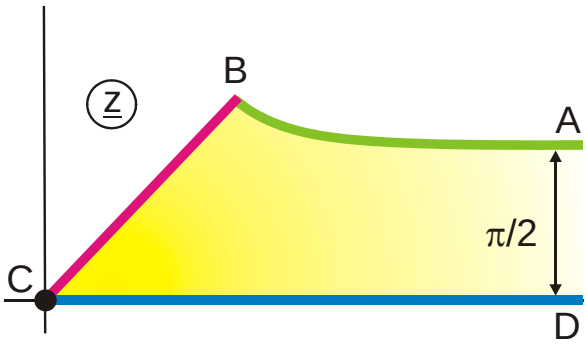


Abbildung N 1 bzw. D 4

$$z = 2j\left(\operatorname{ar\,tanh} w_2 - \arctan w_2\right) + j\pi + \pi$$

$$w_2 = \sqrt{w_1} \qquad w_1 = \tanh\left(w\pi\right)$$

$$-1 \le u \le 1 \qquad 0{,}25 \le v \le 0{,}5$$

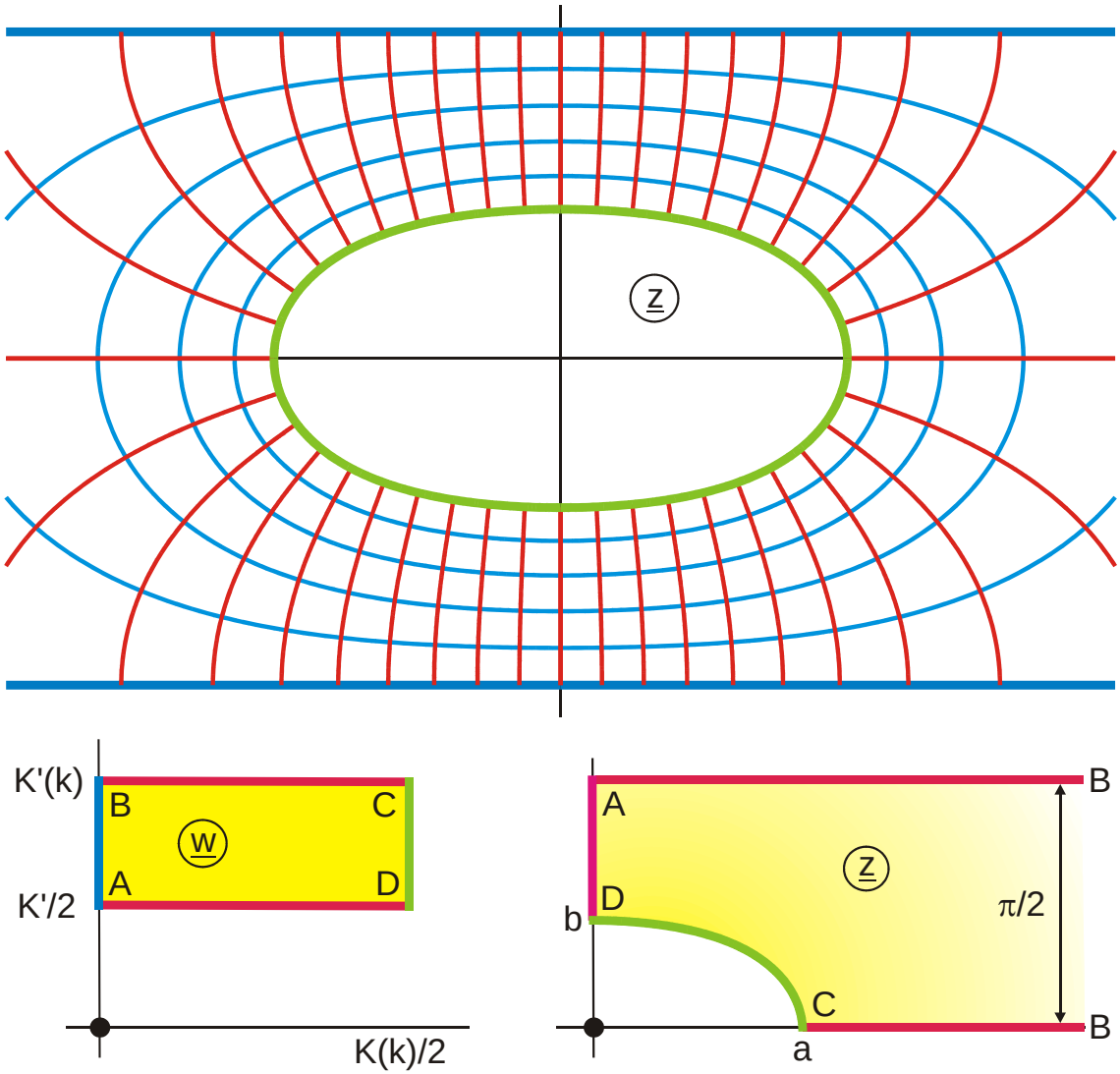


Abbildung N 1.1 bzw. H 7

$z = \ln sn\,(w,k) - d/2$

gegeben: d

$k = \exp(-d)$

$0 \le u \le K(k)/2$ $\qquad$ $K'(k)/2 \le v \le K'(k)$

$a = \ln\sqrt{\frac{k}{1-k'}}$ $\qquad$ $b = \arctan\sqrt{\frac{1-k}{1+k}}$

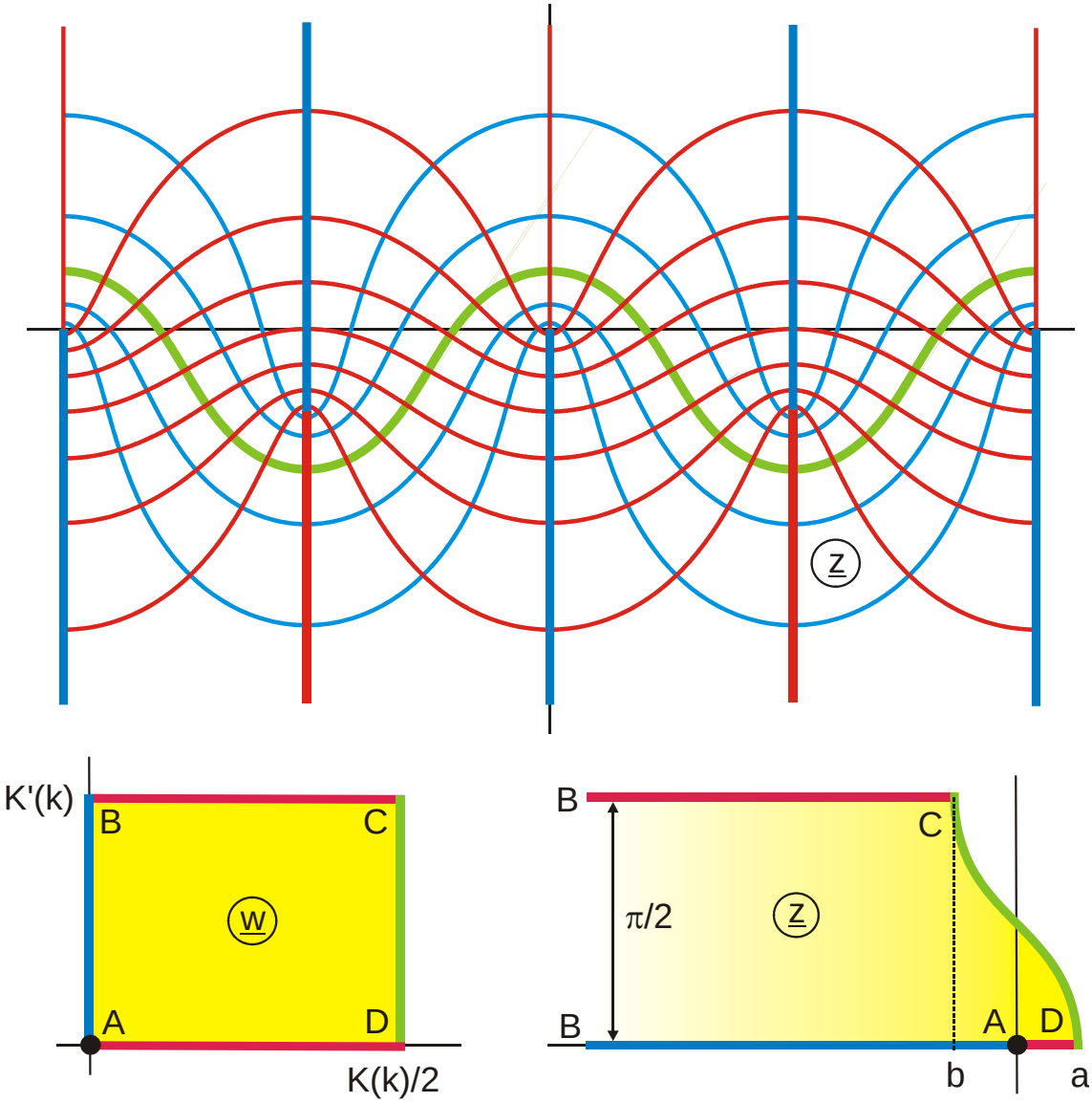


Abbildung N 1.2 bzw. H 1.3

$z = -\ln \operatorname{cn}(w,k)$

$0 \le u \le K(k)/2$ $\qquad$ $0 \le v \le K'(k)$

gegeben: k

$a = \ln\sqrt{1+1/k'}$ $\qquad$ $b = -\ln\sqrt{1/k'-1}$

$a = b = \ln\sqrt{1+1/\sqrt{2}}$ für $k = 1/\sqrt{2}$

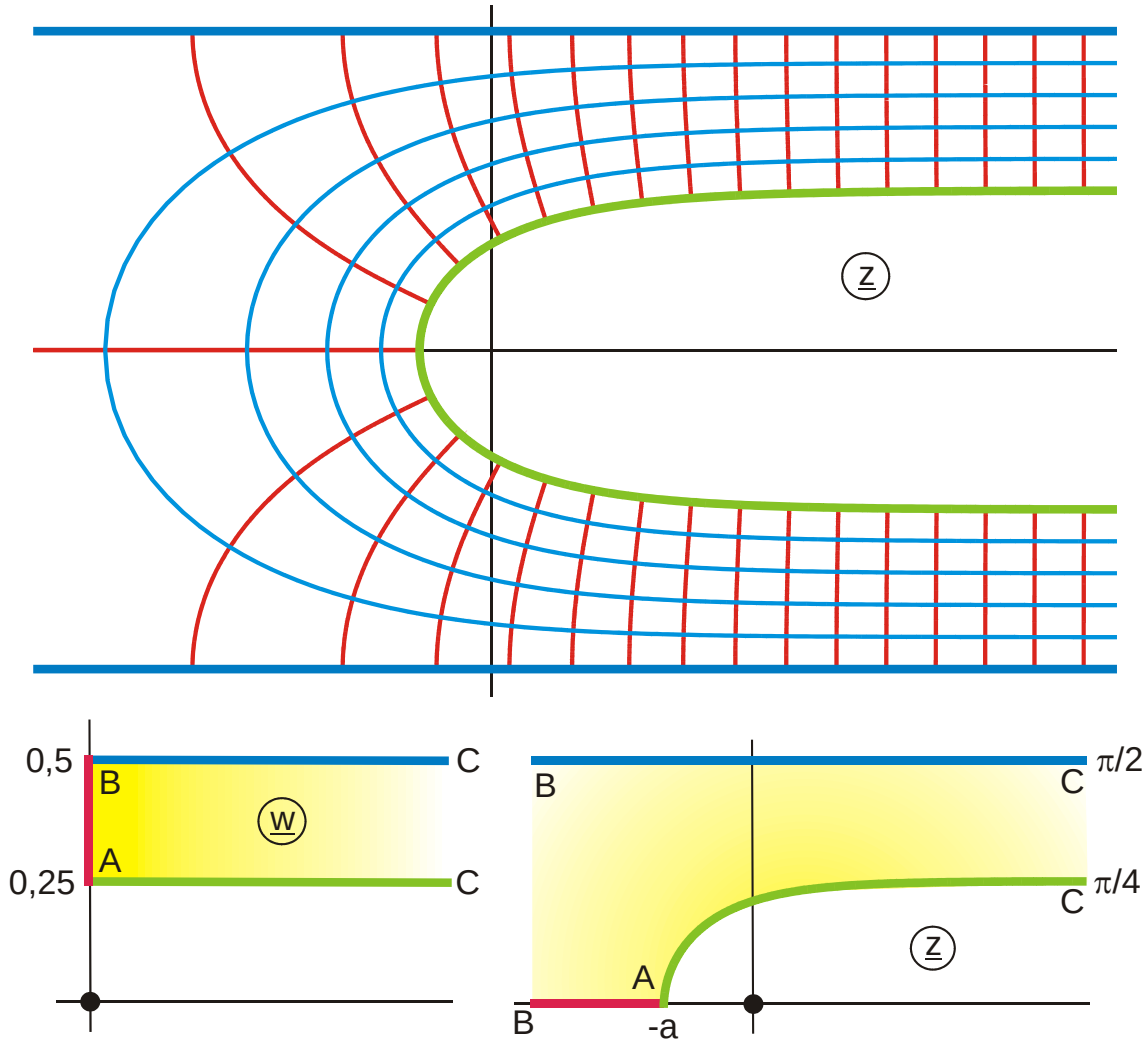


Abbildung N 1.3 bzw. H 1.6

$z = \ln \cosh(w\pi)$

$a = \frac{\ln(2)}{2}$

$0 \le u \le 1{,}5$

$0{,}25 \le v \le 0{,}5$

$\frac{dz}{dw} = \tanh(w\pi)$ Abb.E1.1

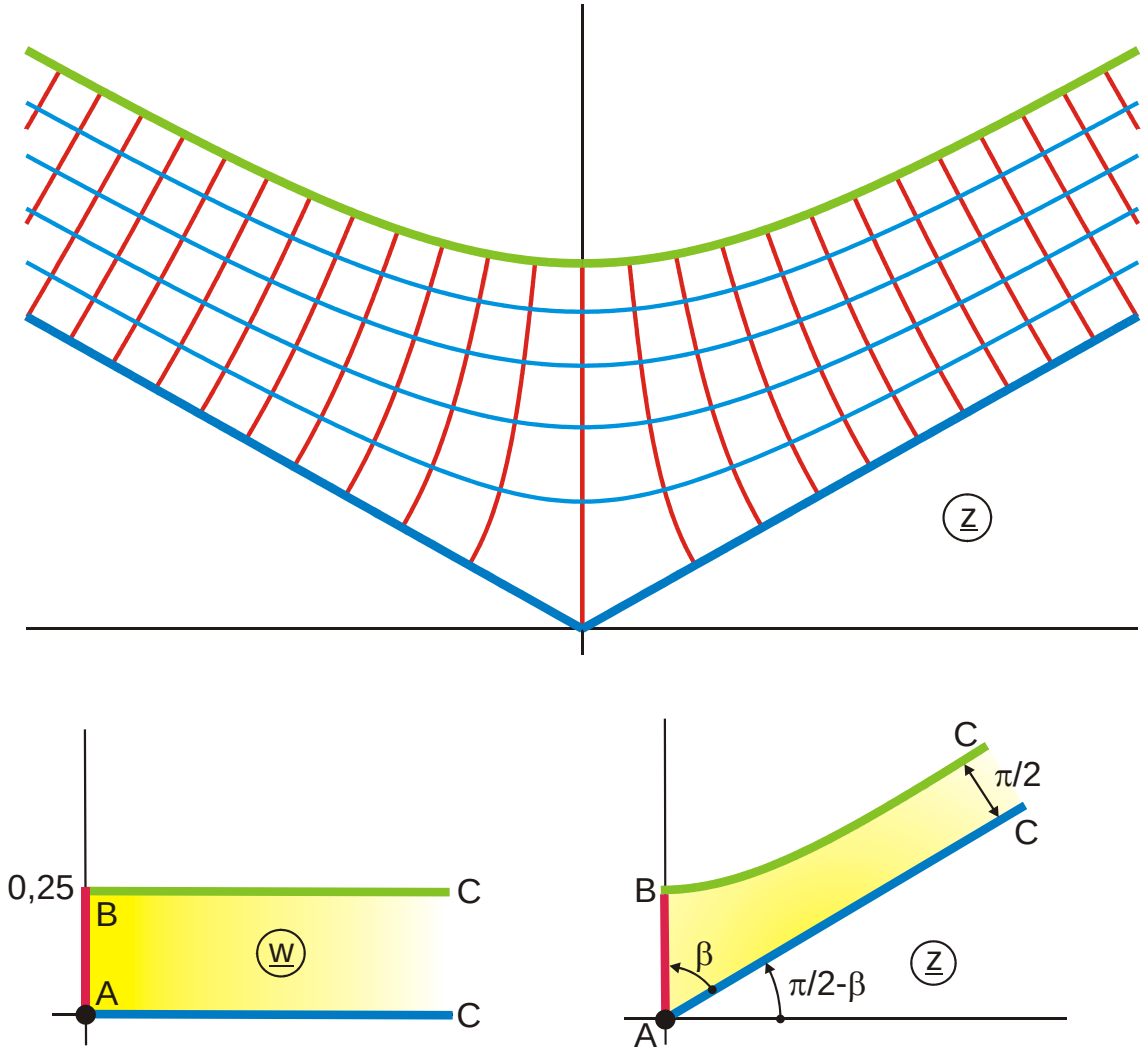


Abbildung N 1.4 bzw. D 4.2

$$z = \sum_{i=0}^{q-1}\left[-t^{p}\ln\left(1-\frac{w_1}{t}\right)\right]\exp\left[j\left(\frac{\pi}{2}\right)-\beta\right]$$

$$w_1 = \left(\tanh\{w\pi\}\right)^{2/q} \qquad t(i) = \exp\left(\frac{j2\pi i}{q}\right)$$

$0 \le u \le 1$ $\qquad$ $0 \le v \le 0{,}25$

gegeben: p, q: >0 und ganzzahlig

$\beta = \pi\, p/q$

$p = 1$ $\qquad$ $q = 3$

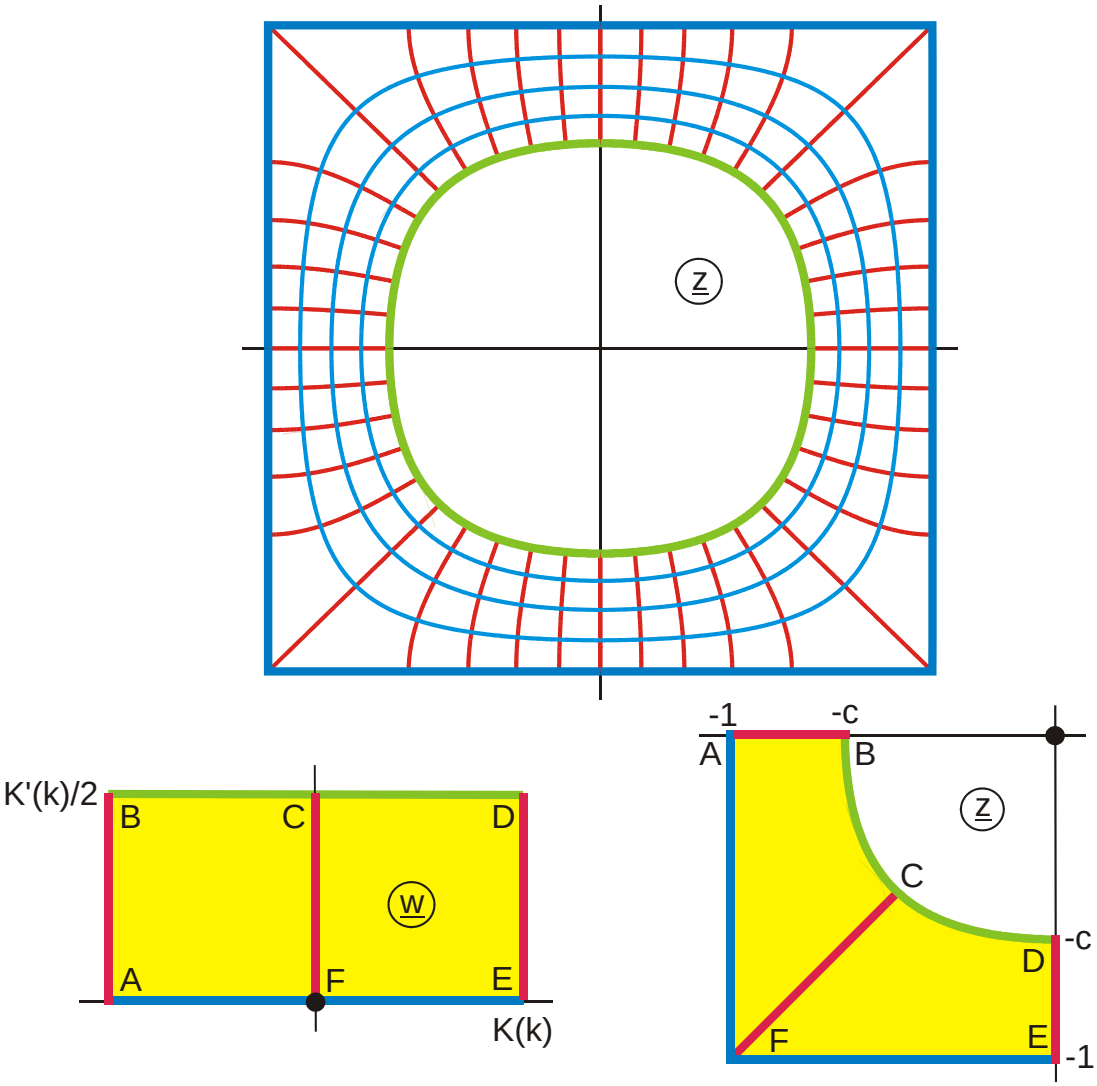


Abbildung N 1.5 bzw. I 5

$$z = \frac{F_a(w_3,k_1)+F_a(w_3,k_1')}{K(k_1)+K'(k_1)} - 1 - j$$

$$w_3 = \sqrt{w_2}$$

$$w_2 = \frac{2w_1(1+k)}{(1+w_1)(1+kw_1)}$$

$$w_1 = sn(w,k)$$

$$\tau_1 = \frac{1-b}{1+b}$$

$$k_1 = \left[\frac{\vartheta_2(0,\tau_1)}{\vartheta_3(0,\tau_1)}\right]^2$$

$$k = \left(\frac{k_1-k_1'}{k_1+k_1'}\right)^2$$

$$-K(k) \le u \le K(k)$$

$$0 \le v \le K'(k)/2$$

$$d = \frac{\sqrt{2(1+k)}}{1+\sqrt{k}}$$

$$c = 1 - \mathrm{Im}\left\{\frac{F_a(d,k_1)+F_a(d,k_1')}{K(k_1)+K'(k_1)}\right\}$$

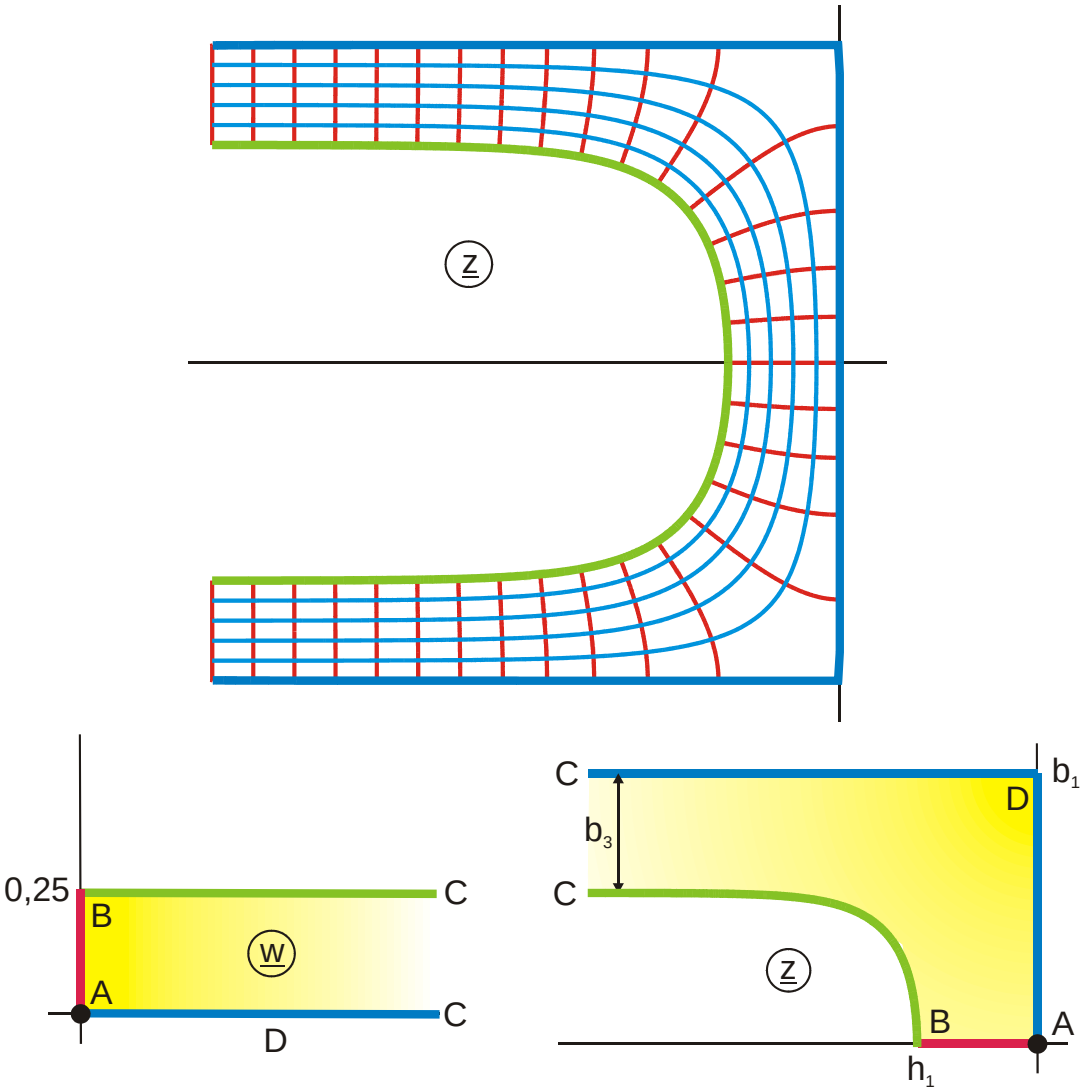


Abbildung N 1.6 bzw. D 6

$$z = \Pi_e\left(w_2, k', K'(k)/2\right) - h$$

$$w_2 = jF_a\left(w_1, k\right) + K'(k)$$

$$w_1 = \frac{1}{\sqrt{k}}\tanh(w\pi)$$

$0 \le u \le 2$ $\qquad$ $0 \le v \le 0{,}25$

gegeben : τ $\qquad$ $h = K'(k)\dfrac{1+k}{2k}$

$$b_1 = K(k)\frac{1+k}{2k} + b_3 \qquad b_3 = \frac{\pi}{4k}$$

$$u_D = \frac{1}{\pi}\operatorname{ar}\tanh\sqrt{k}$$

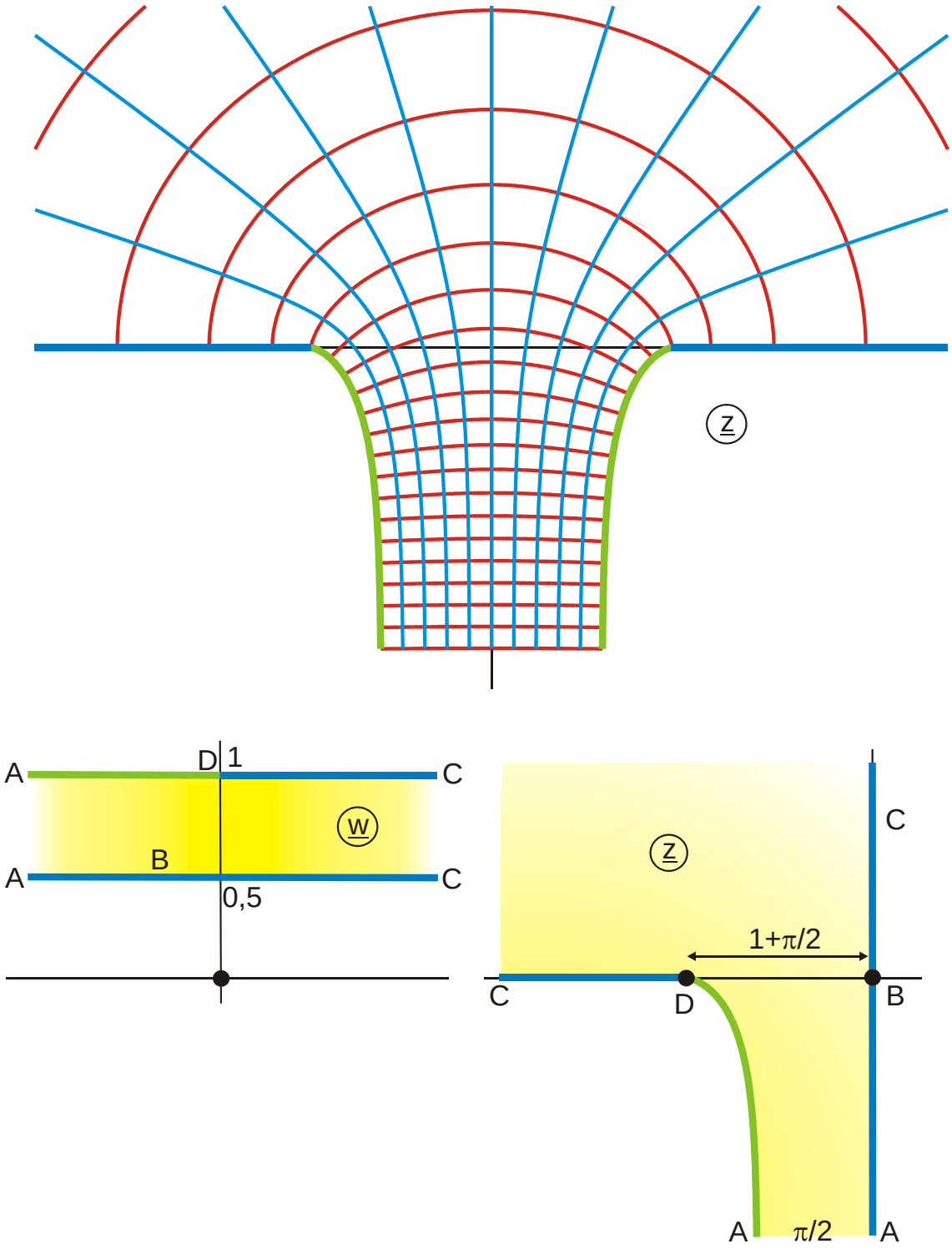


Abbildung N 2 (π/2-Borda-Profil)

$$z = \arctan\sqrt{w_1^2 - 1} + w_1 - \sqrt{w_1^2 - 1} - \pi/2$$

$w_1 = \exp(w\pi)$

$-1{,}5 \le u \le 0{,}5$ $\qquad$ $0{,}5 \le v \le 1$

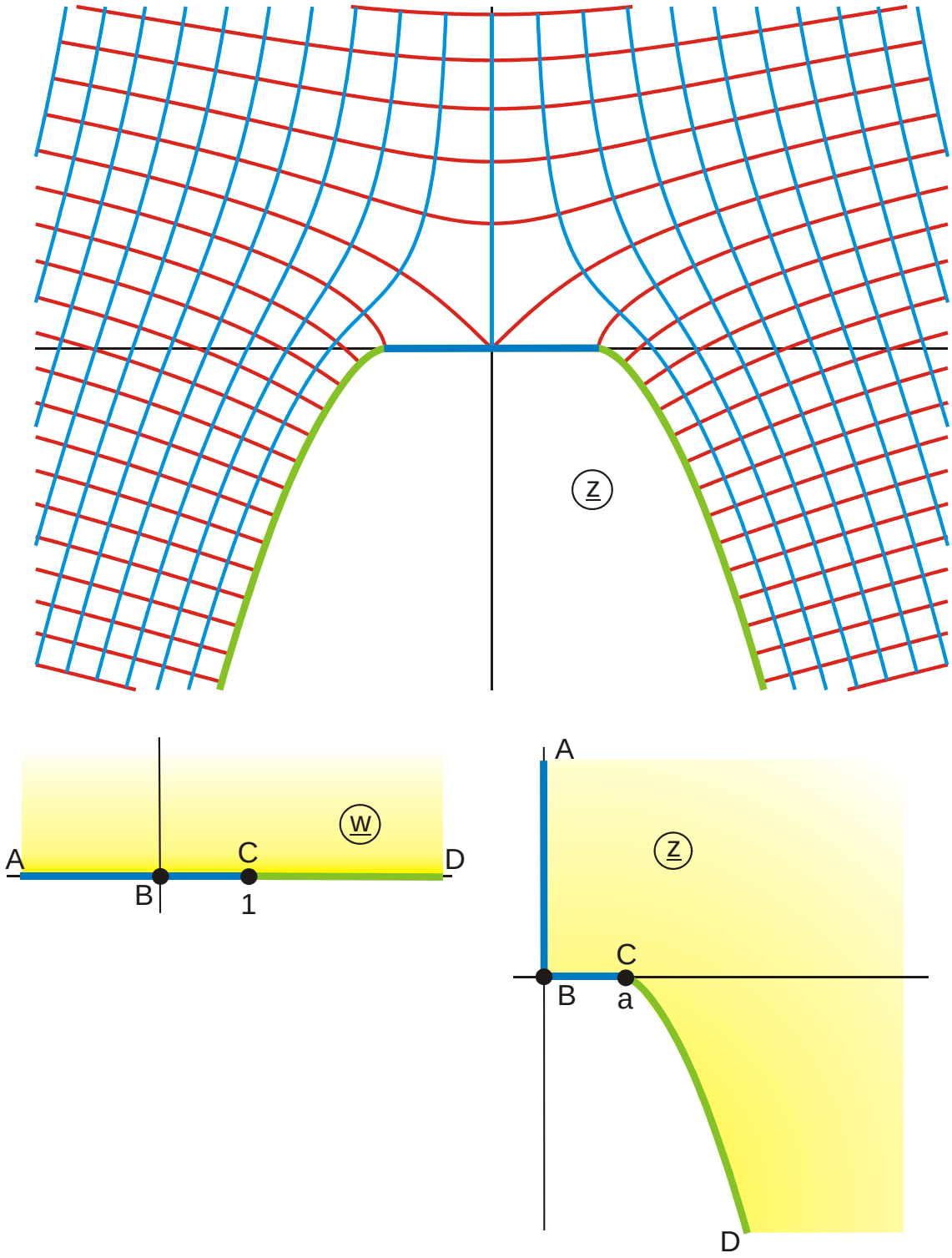


Abbildung N 2.1

$$z = 2\sqrt{w} + \sqrt{w}\sqrt{1-w} + \arcsin\sqrt{w}$$

$a = 2 + \pi/2$

$-5 \le u \le 15$ $\qquad$ $0 \le v \le 10$

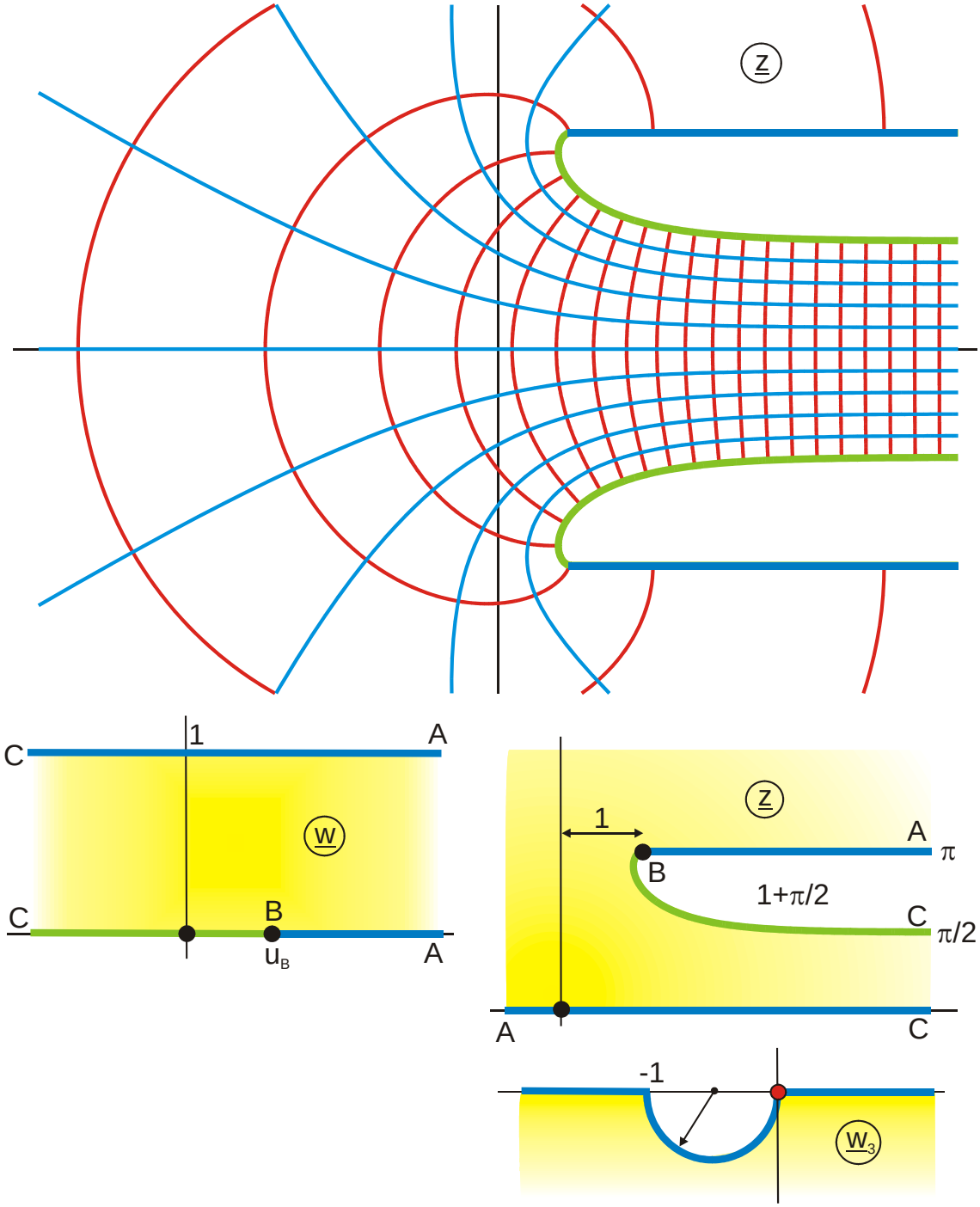


Abbildung N 2.2 (π-Borda-Profil, Bordas Mundstück)

$z = -w_3 - \ln w_3$

$w_3 = -w_2 / 2$

$w_2 = \frac{w_1}{2}\left(1 + \sqrt{1 - 4/w_1}\right)$

$w_1 = \exp(w\pi)$

$u_b = \ln(4)/\pi$

$-5\ u_B \le u \le 10\ u_B$

$0 \le v \le 1$

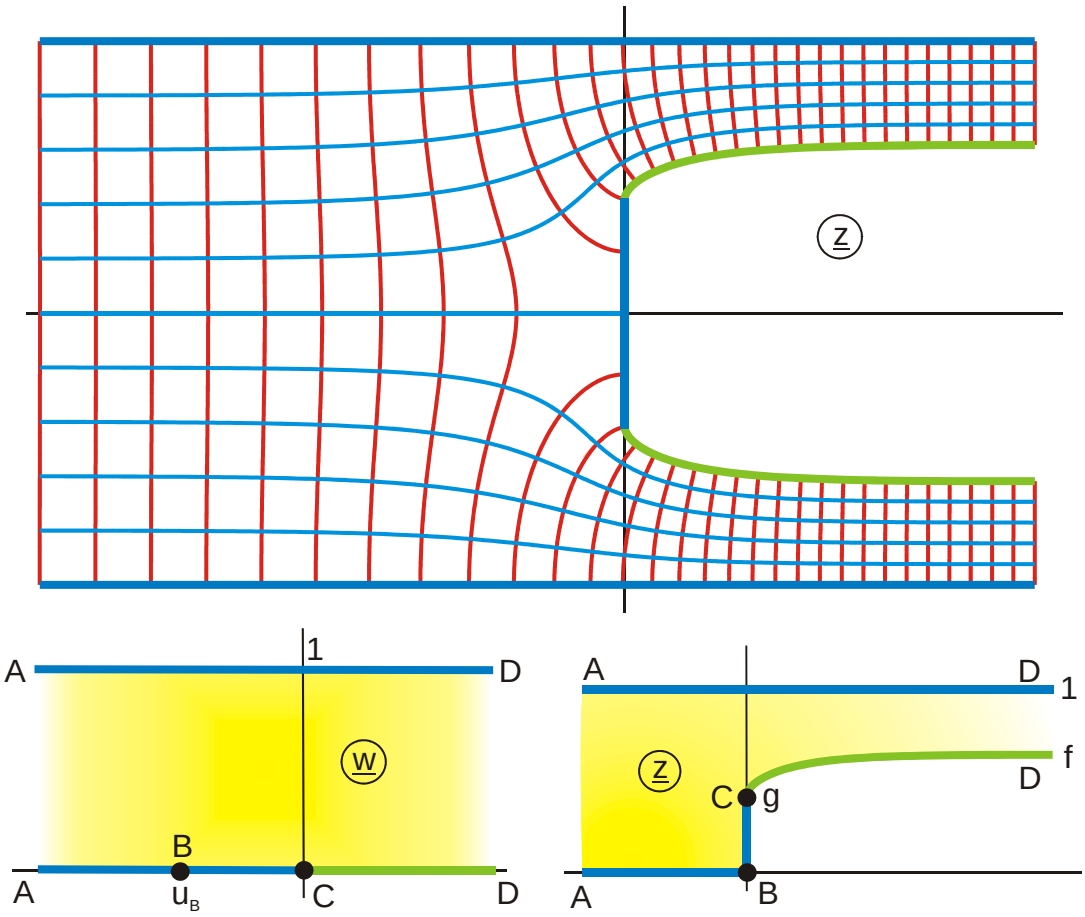


Abbildung N 3 bzw. C 5

$$z = \left\{ \frac{2}{\pi}\left[\text{ar tanh}(b w_2) - b\ \text{ar tanh}(w_2)\right] + j(b-1) - j\frac{2a}{\pi}\arcsin w_3 + ja \right\} / h$$

$$w_3 = \frac{1}{b\exp(w\pi/2)} \qquad w_2 = \sqrt{\frac{w_1 - 1}{b^2 w_1 - 1}}$$

$w_1 = \exp(w\pi)$ $\qquad h = a + b$

gegeben: a, b

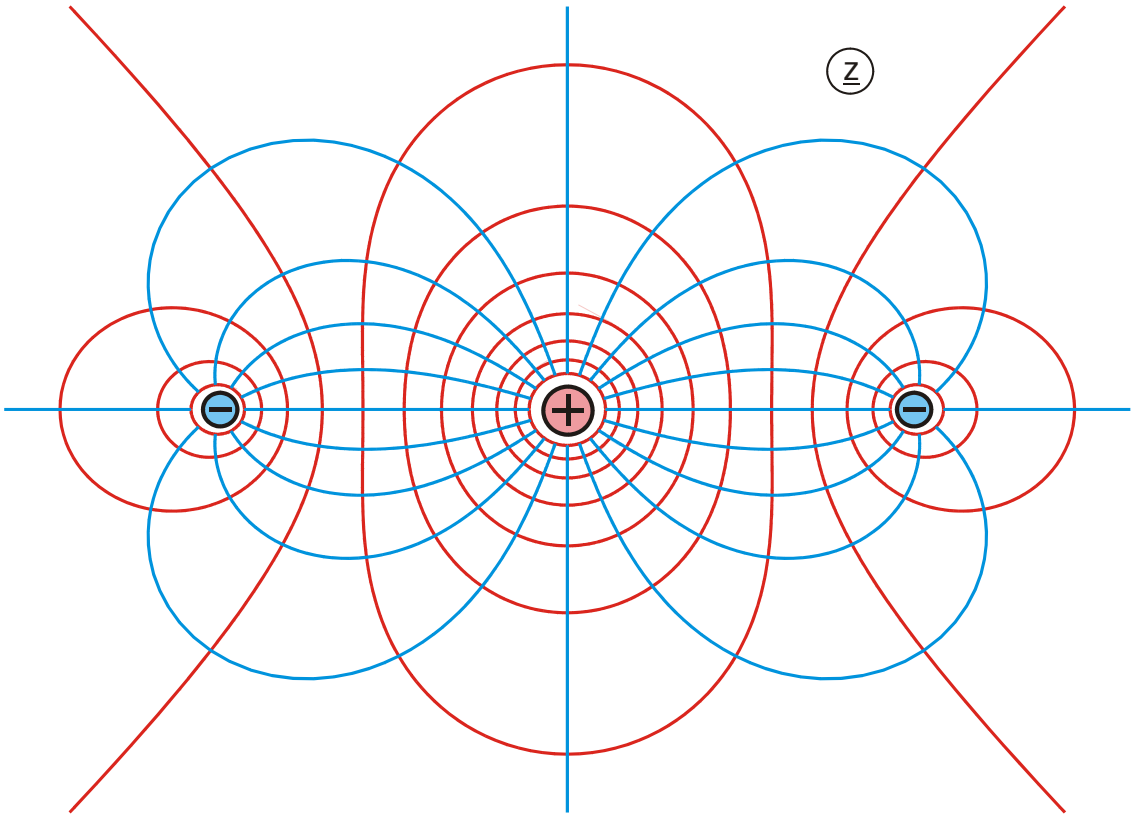
$$u_B = \frac{2}{\pi}\ln b \qquad f = \frac{b - 1 + a}{h}$$

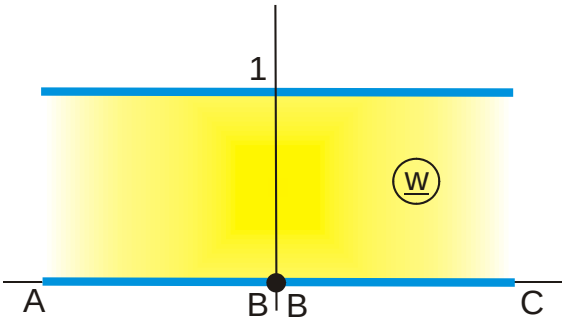
$$g = \frac{b - 1 + v_C}{h} \qquad v_C = a - \frac{2a}{\pi}\arcsin\frac{1}{b}$$

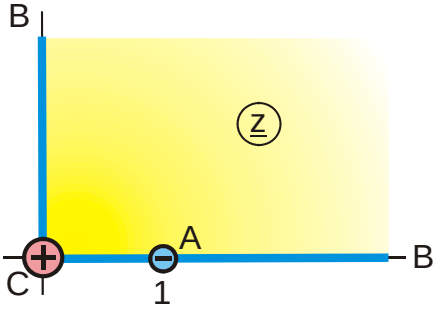
$-2 \le u \le 4$ $\qquad 0 \le v \le 1$

Abbildungen Gruppe P

Drei und mehr leitende Elektroden







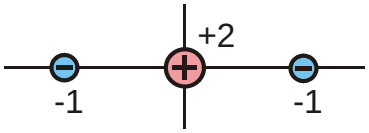


Abbildung P1

(inverse Cassinische Kurven)

$z = 1/\sqrt{1 - E}$

$E = \exp(\pi w)$

$-0{,}6 \le u \le 1{,}2$

$0 \le v \le 1$

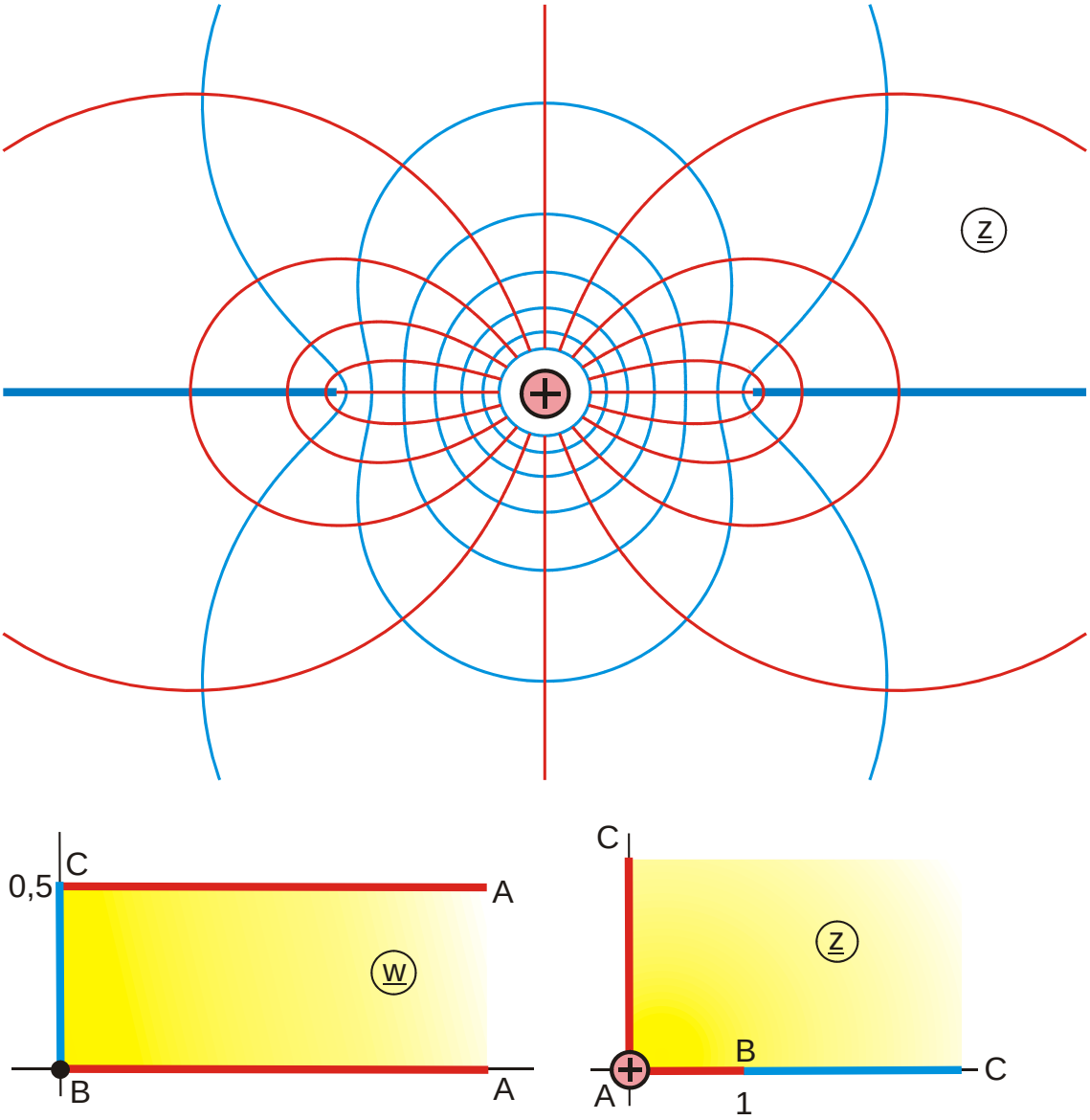


Abbildung P 1.1 (inverse Ellipsen)

$$z = \frac{2}{E + 1/E} \qquad E = \exp(\pi w)$$

$$\text{oder } z = \frac{1}{\cosh(\pi w)}$$

$$0 \le u \le 0{,}7 \qquad 0 \le v \le 0{,}5$$

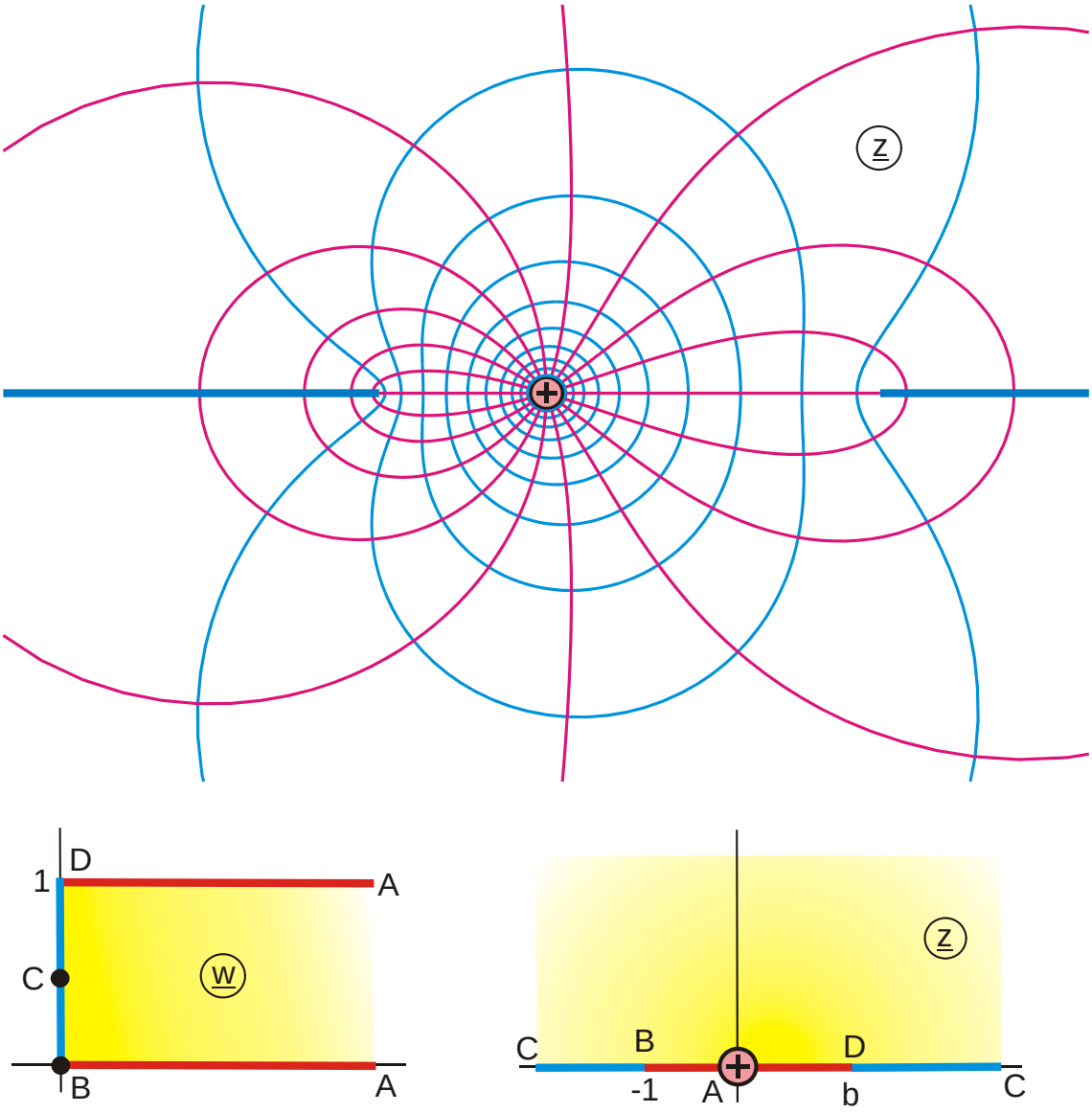


Abbildung P1.2

$$z = \frac{-(1+\sigma)}{\sigma + \cosh(\pi w)}$$

$$\sigma = \frac{b-1}{b+1} \qquad \sigma < 1$$

$$v_C = \frac{1}{\pi}\arccos(-\sigma)$$

$0 \le u \le 1$ $0 \le v \le 1$

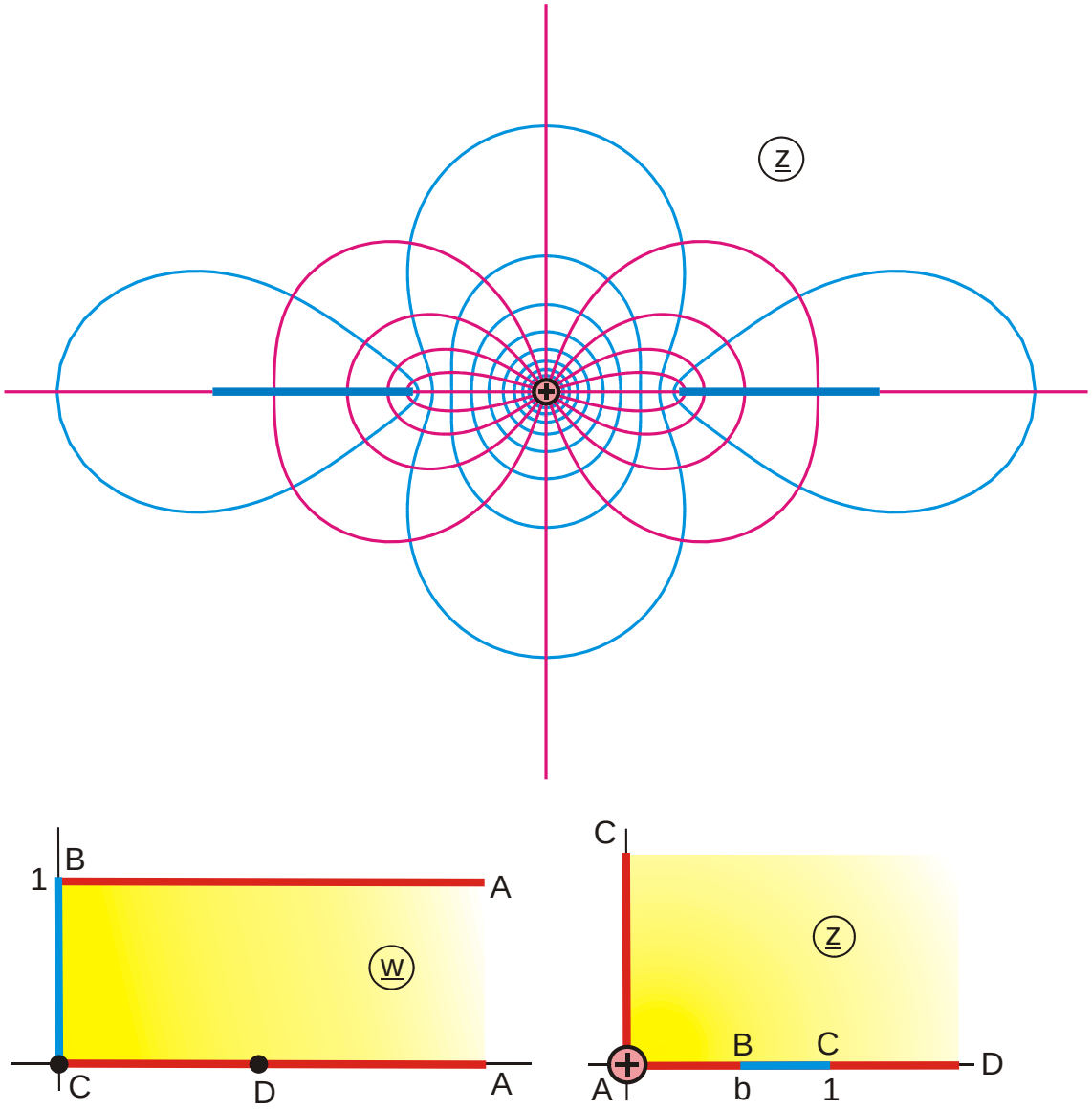


Abbildung P1.3

$$z = \frac{j\sqrt{a-1}}{\sqrt{\cosh(\pi w) - a}}$$

$$a = \frac{1+b^2}{1-b^2}$$

a > 1, b < 1

$$u_D = \frac{1}{\pi} ar\cosh a$$

$0 \le u \le 2$

$0 \le v \le 1$

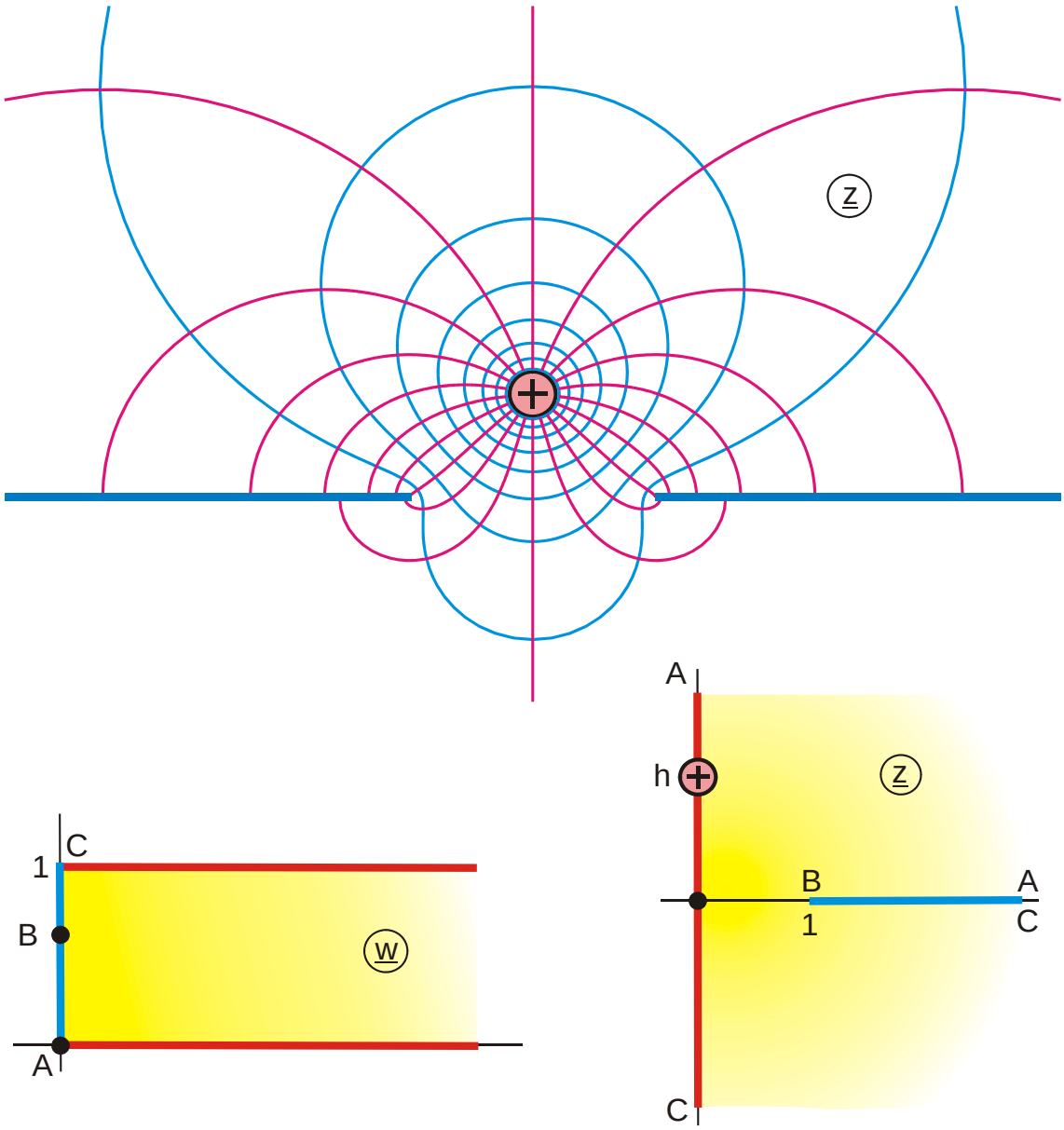


Abbildung P1.4

$$z = (w_1 + 1/w_1)/2$$

$$w_1 = ja\frac{1-E}{1+E}$$

$$E = \exp(\pi w)$$

$$h = 0{,}6$$

$$a = \sqrt{1+h^2} - h$$

$$v_B = \frac{2}{\pi}\arctan\frac{1}{a}$$

$$0 \le u \le 0{,}8$$

$$0 \le v \le 1$$

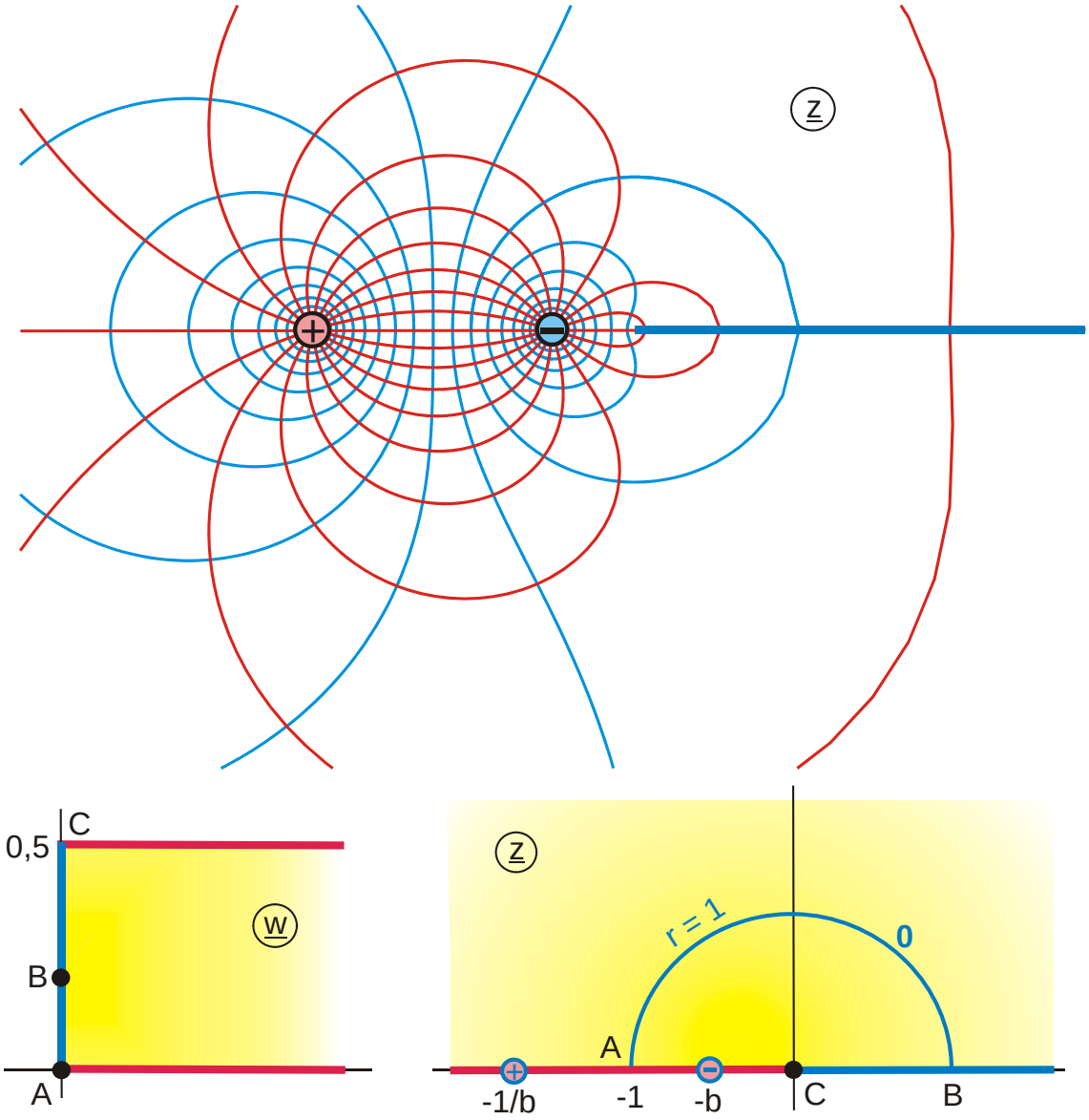


Abbildung P1.5

$z = -w_2^{\,2}$

$w_2 = w_1 \pm \sqrt{w_1^{\,2} + 1}$

$w_1 = a \tanh(w\pi)$

$b = 0{,}51067$

$a = \dfrac{b-1}{2\sqrt{b}}$

$v_B = \dfrac{1}{\pi} \arctan \dfrac{1}{a}$

$0 \le u \le 0{,}5$

$0 \le v \le 0{,}5$

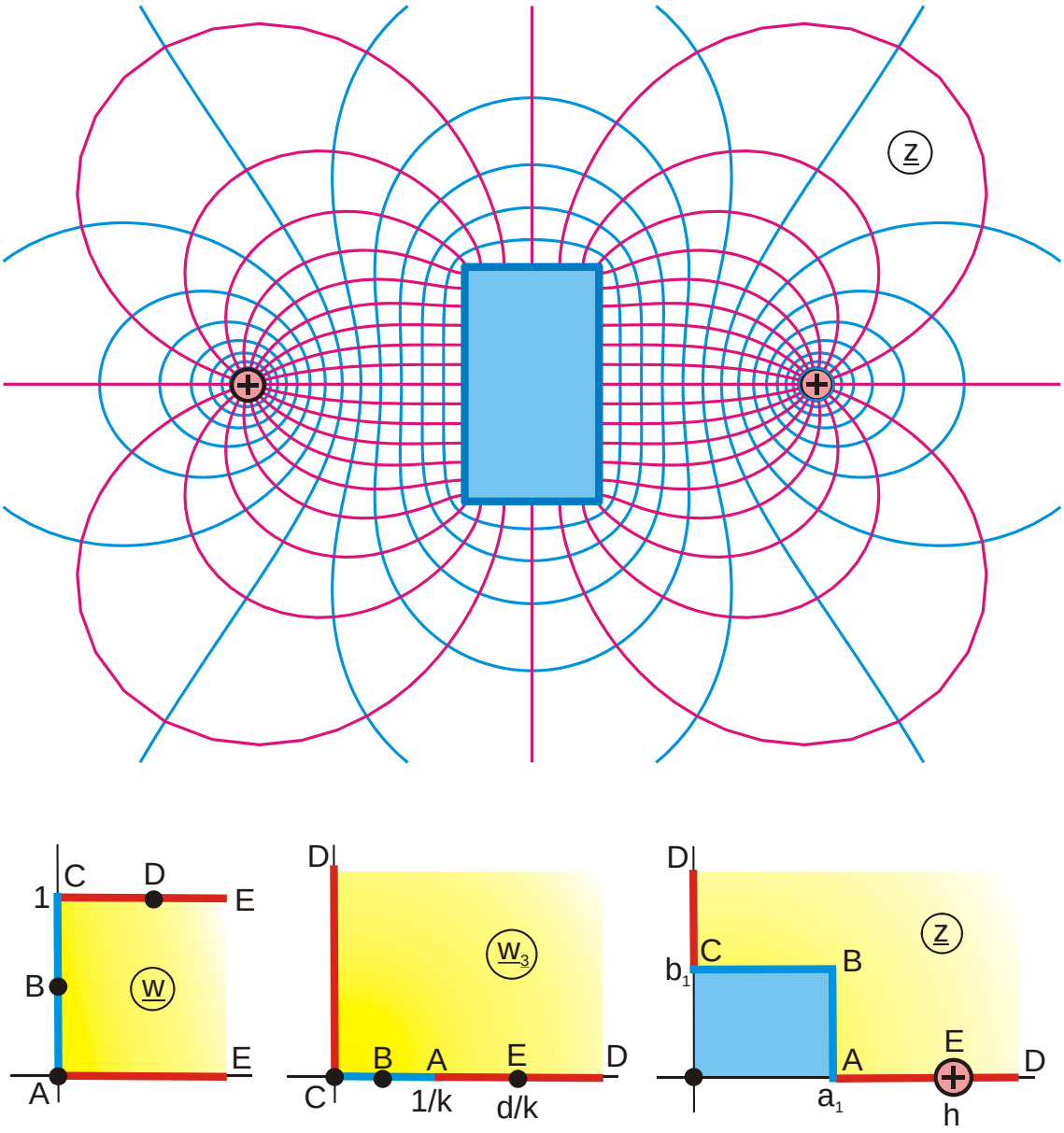


Abbildung P1.6

$$z = B_a(w_3, k) + jb_1$$

$$w_3 = (w_2 + 1/w_2)/(2k)$$

$$w_2 = \sqrt{w_1}$$

$$w_1 = \frac{1 + a\exp(w\pi)}{a + \exp(w\pi)}$$

$$a = \left(d - \sqrt{d^2 - 1}\right)^2$$

$$h = B_a\left(d/k, k\right)$$

$$a_1 = \frac{E(k) - k'^2\,K(k)}{k^2}$$

$$b_1 = \frac{E'(k)}{k^2} - K'(k)$$

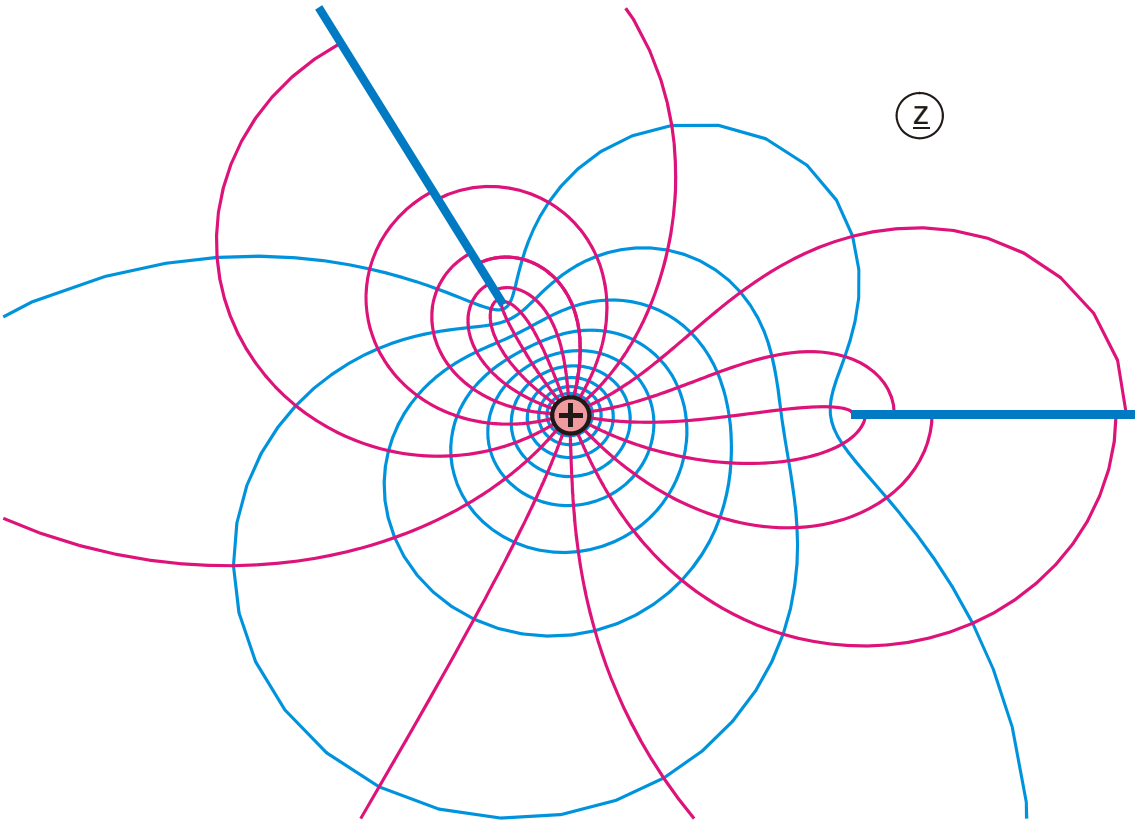
$$0 \le u \le 1{,}5$$

$$0 \le v \le 1$$

$$u_D = -\frac{1}{\pi}\ln a$$

$$k = 0{,}6$$

$$d = 1{,}5$$



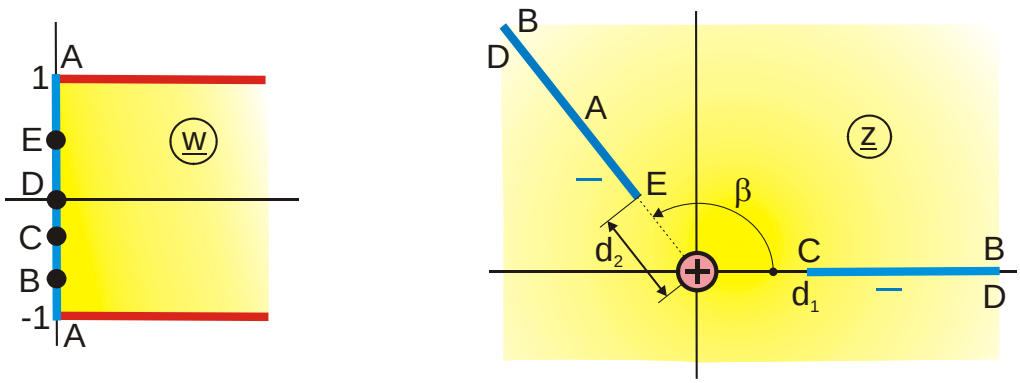


Abbildung P 1.7

$$z = \left(\frac{a}{b} - \frac{1-a}{1-b} w_1 + \frac{1}{2-b} w_1^{\,2} \right) \Big/ w_1^{\,b}$$

$$w_1 = p + jq \frac{1+\exp(\pi w)}{1-\exp(\pi w)}$$

$$v_C = -\frac{2}{\pi} \arctan \frac{q}{1-p}$$

$$v_E = \frac{2}{\pi} \arctan \frac{q}{a+p}$$

$$d_1 = \frac{1}{2-b} + \frac{a-b}{b(1-b)}$$

$$d_2 = \frac{\frac{a}{b} - \frac{a^2}{2-b}}{a^b (1-b)}$$

$$p = \frac{(a-1)(b-2)}{2(1-b)}$$

$$q = \sqrt{\frac{a(2-b)}{b} - p^2}$$

$0 \le u \le 1$ $\quad$ $-1 \le v \le 1$

$b = \beta/\pi$ $\quad$ $a = 1{,}3$ $\quad$ $\beta = 120°$

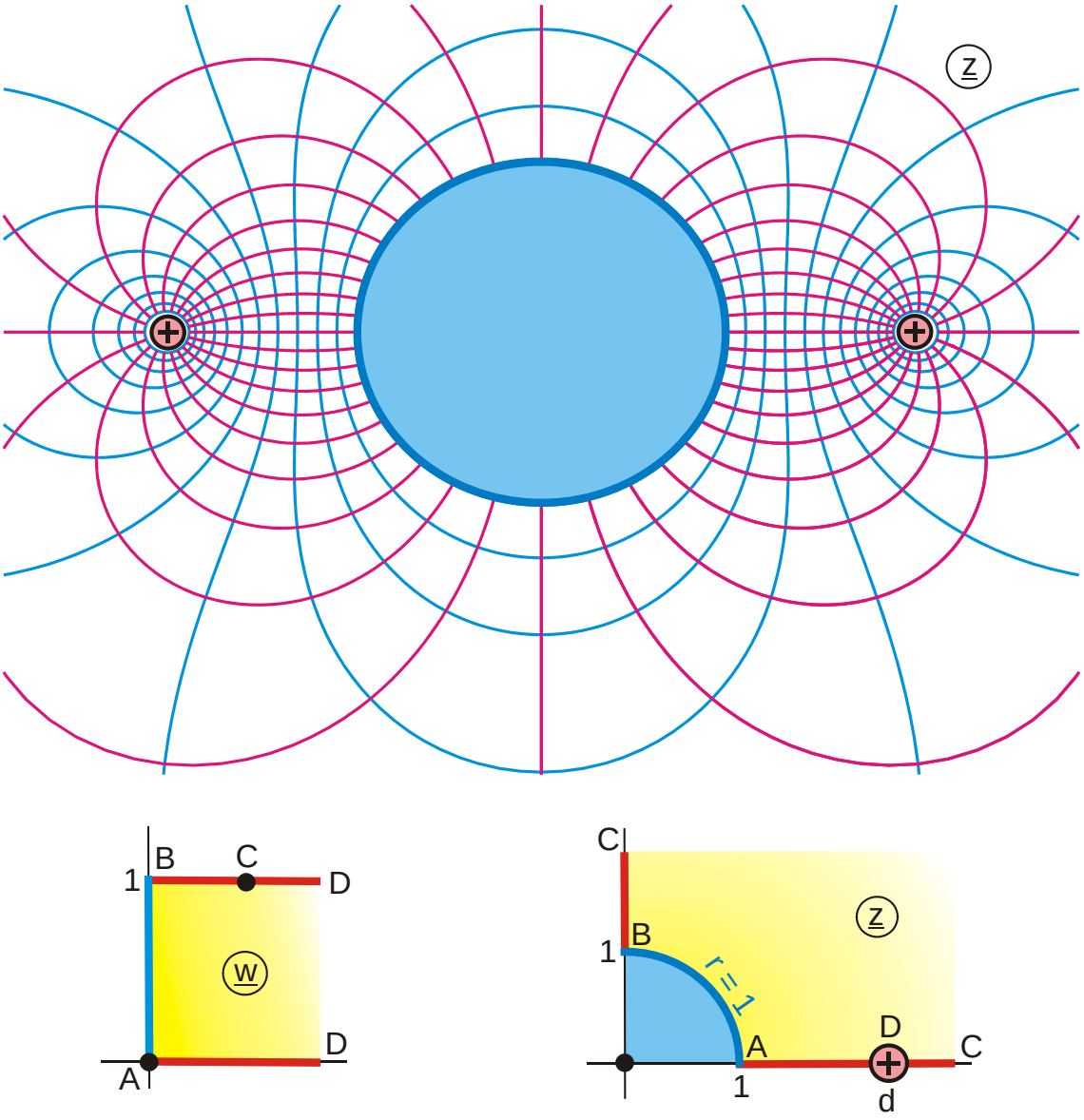


Abbildung P 1.8

$z = \sqrt{w_1}$

$w_1 = \dfrac{1 + aE}{a + E}$

$E = \exp(w\pi)$

$a = d^2$

$u_C = \dfrac{1}{\pi} \ln a$

$0 \le u \le 1{,}1$

$0 \le v \le 1$

$x_C = \sqrt{\dfrac{a + 1/a}{2}}$

$d = 2$

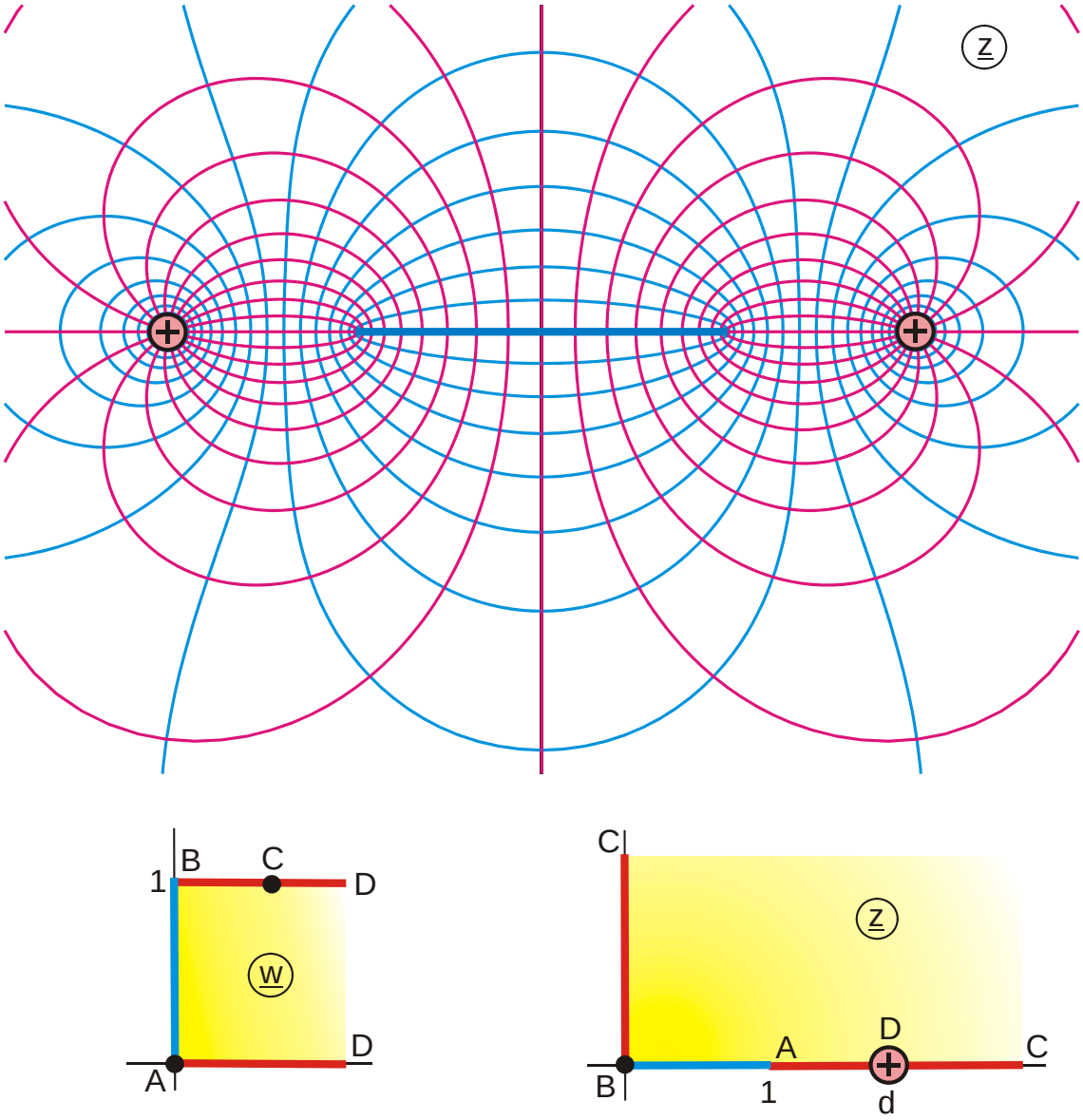


Abbildung P 1.9

$$z = \left(w_2 + 1/w_2\right)/2 \qquad w_2 = \sqrt{w_1}$$

$$w_1 = \frac{1 + aE}{a + E} \qquad E = \exp(w\pi)$$

$$a = \left(d - \sqrt{d^2 - 1}\right)^2 \qquad u_C = -\frac{1}{\pi}\ln a$$

$$0 \le u \le 1{,}5 \qquad 0 \le v \le 1$$

$$x_C = \left(\sqrt{\frac{a + 1/a}{2}} + 1\Big/\sqrt{\frac{a + 1/a}{2}}\right)\Big/2$$

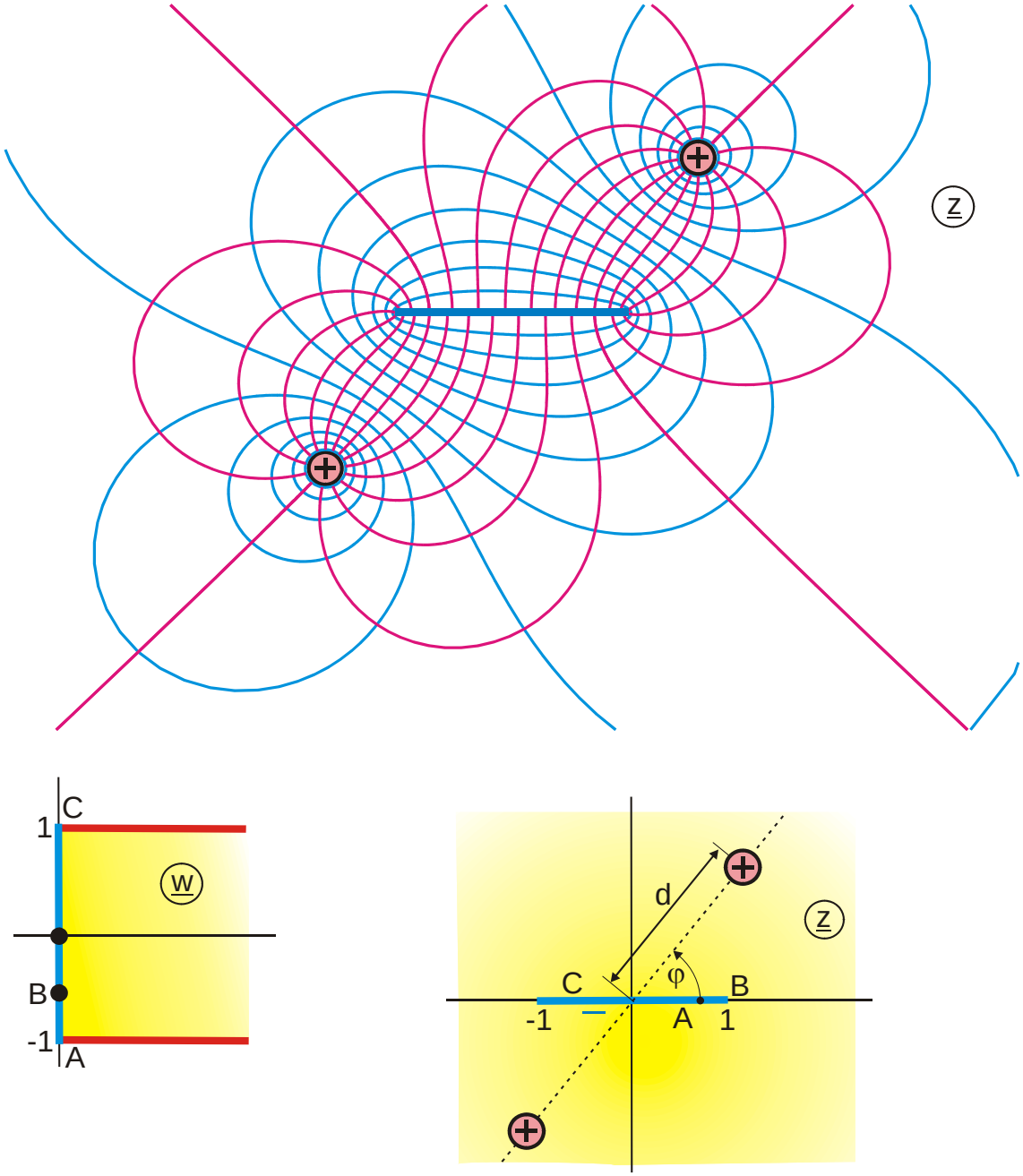


Abbildung P 1.10

$$z = \pm\left(w_3 + 1/w_3\right)/2 \qquad w_3 = e^{-j\varphi}\sqrt{w_2}$$

$$w_2 = \frac{1 + a w_1}{a + w_1} \qquad w_1 = \exp(w\pi)$$

$$a = \left(d - \sqrt{1 - d^2}\right)^2$$

$0 \le u \le 1{,}5$ $\qquad -1 \le v \le 1$

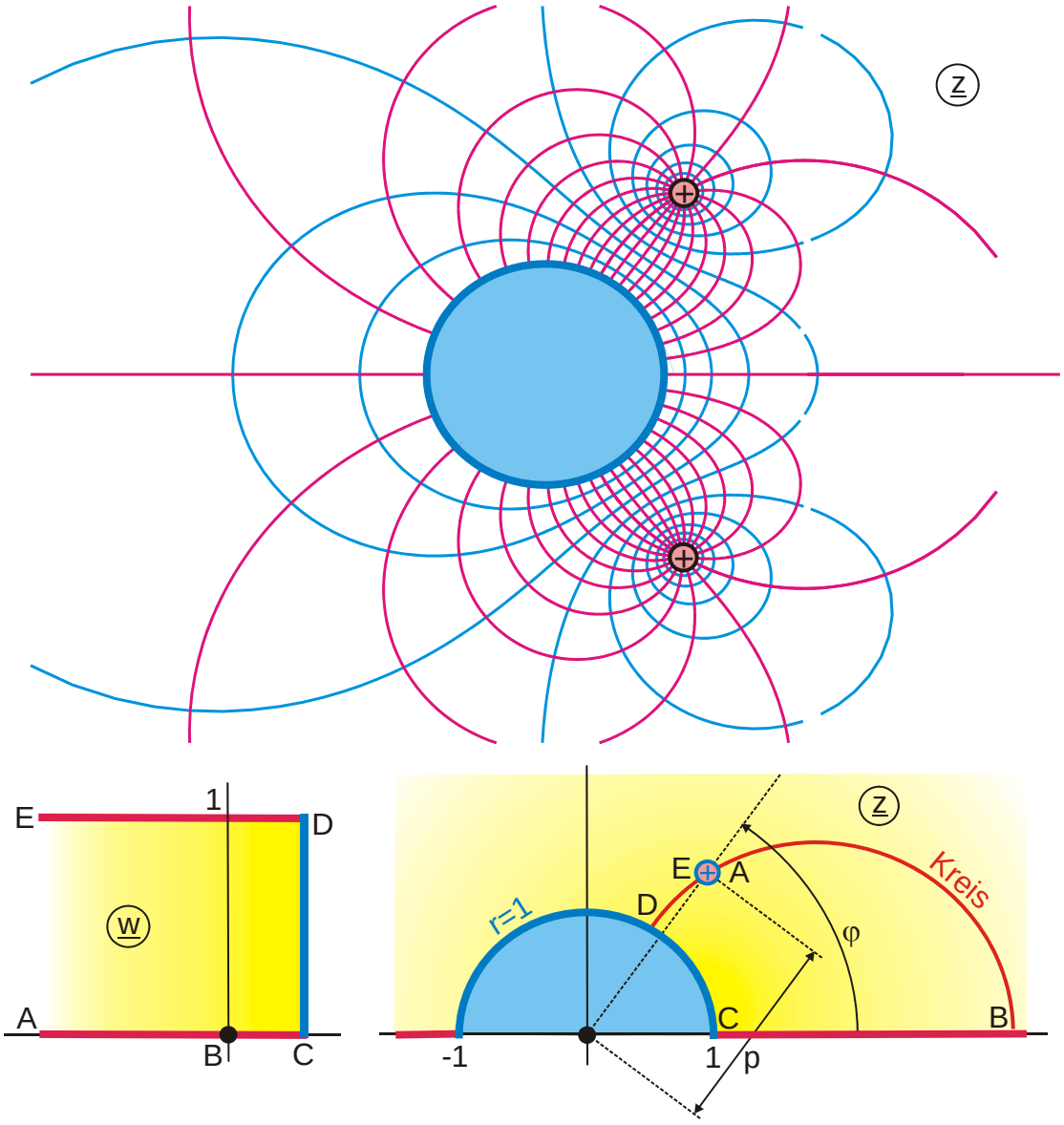


Abbildung P 1.11

$$z = \pm\sqrt{\frac{c}{a} + d^2} - d$$

$$u_C = \frac{2}{\pi}\ln p$$

$d = b/(2a)$

$a = 1 - \exp(\pi w)$

$$b = 2\left[\frac{\exp(\pi w)}{p} - p\right]\cos\varphi$$

$$c = \frac{\exp(\pi w)}{p^2} - p^2$$

$-0{,}7 \le u \le u_C$

$0 \le v \le 1$

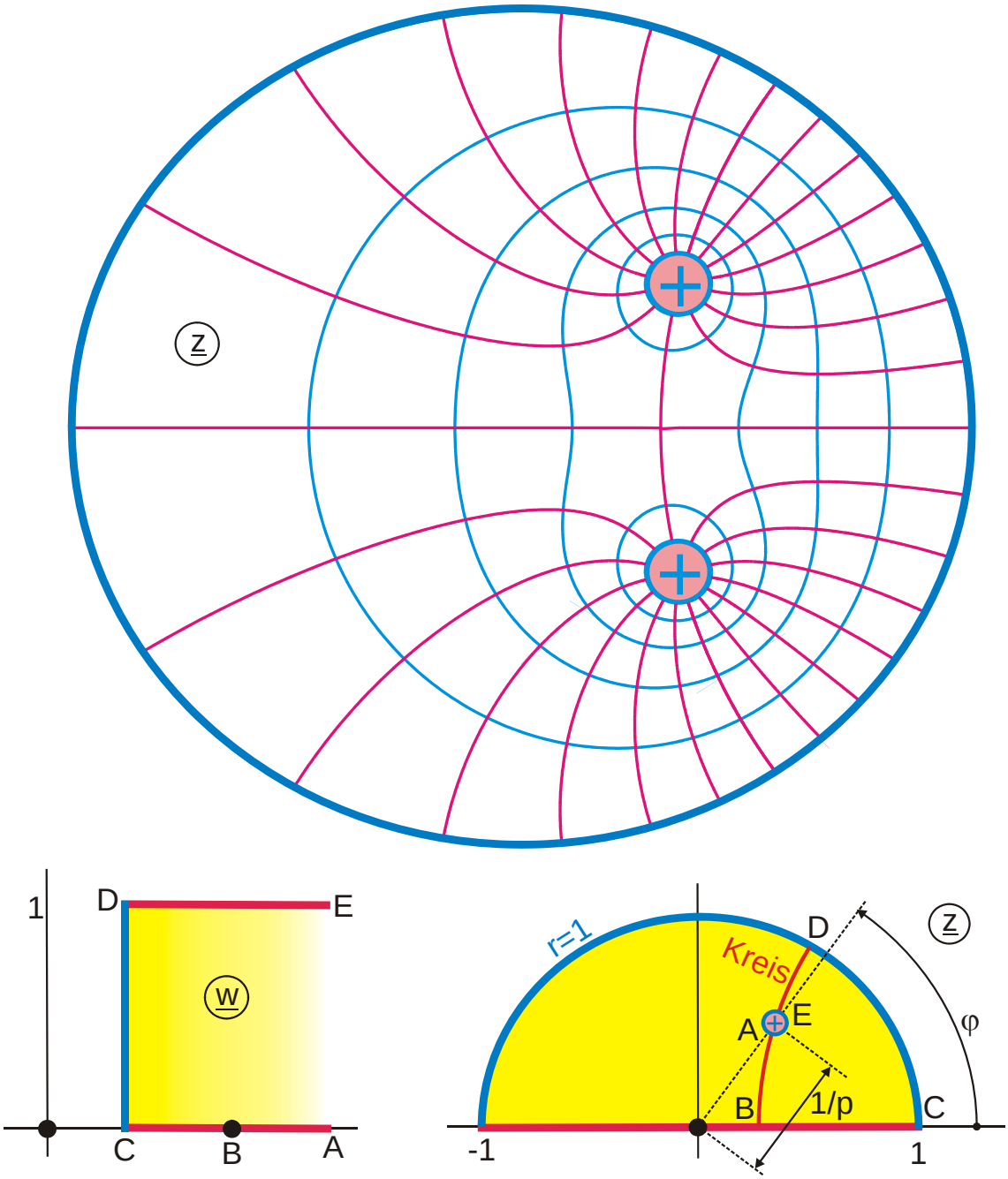


Abbildung P 1.12

$$z = \pm\sqrt{\frac{c}{a} + d^2} - d$$

$$u_C = \frac{2}{\pi}\ln p$$

$d = b/(2a)$

$a = 1 - \exp(\pi w)$

$$b = 2\left[\frac{\exp(\pi w)}{p} - p\right]\cos\varphi$$

$$c = \frac{\exp(\pi w)}{p^2} - p^2$$

$u_C \le u \le 1{,}3$

$0 \le v \le 1$

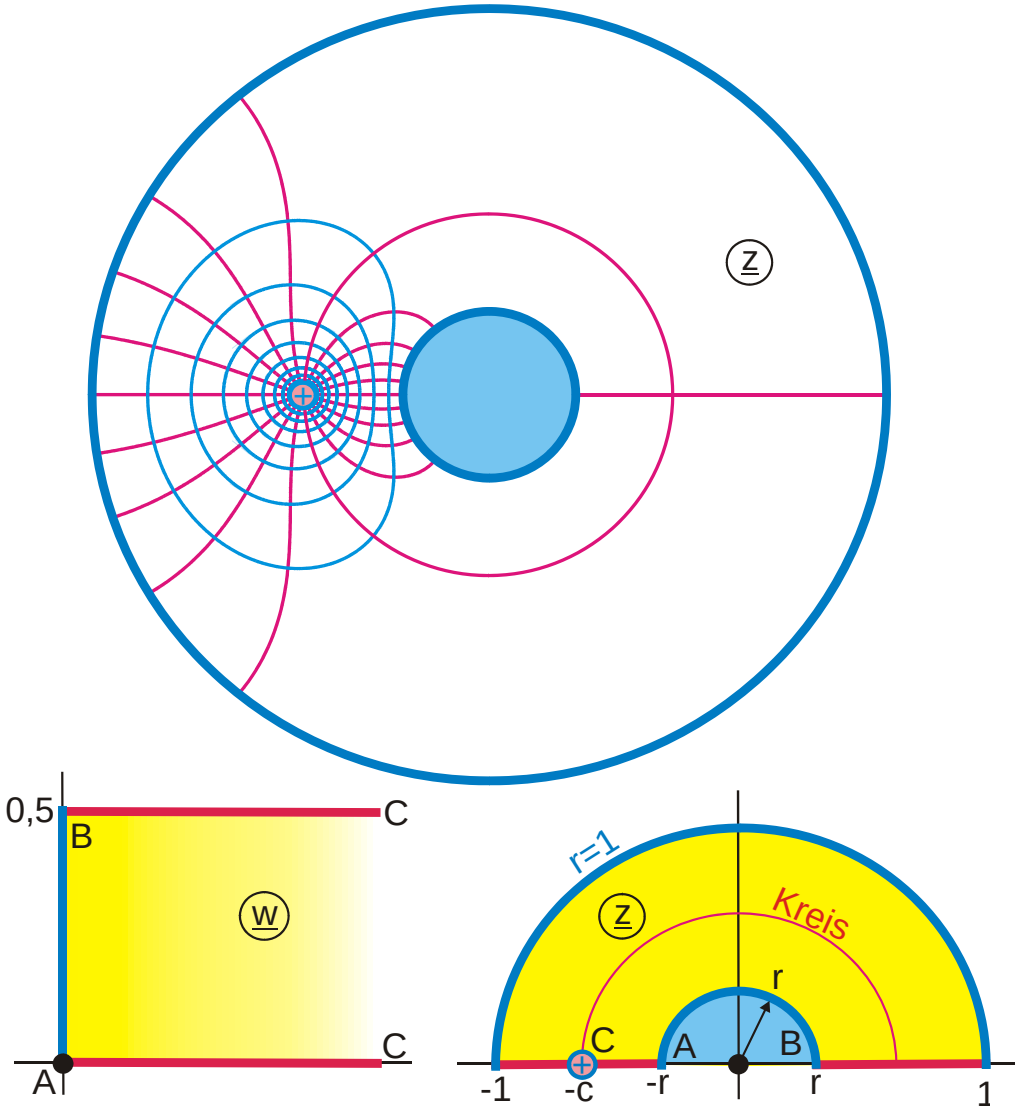


Abbildung P 1.13

$$z = -\frac{w_2}{\sigma^2}$$

$$w_1 = -j\pi \frac{F_t(w\pi, k)}{K(k)}$$

$$w_2 = \exp w_1$$

$$\sigma = h + \sqrt{h^2 - 1}$$

$$\tau = \frac{1}{\pi} \ln \sigma$$

gegeben: h

$$k = \left[\frac{\vartheta_2(0,\tau)}{\vartheta_3(0,\tau)} \right]^2$$

$0 \le u \le 0{,}8$

$0 \le v \le 0{,}5$

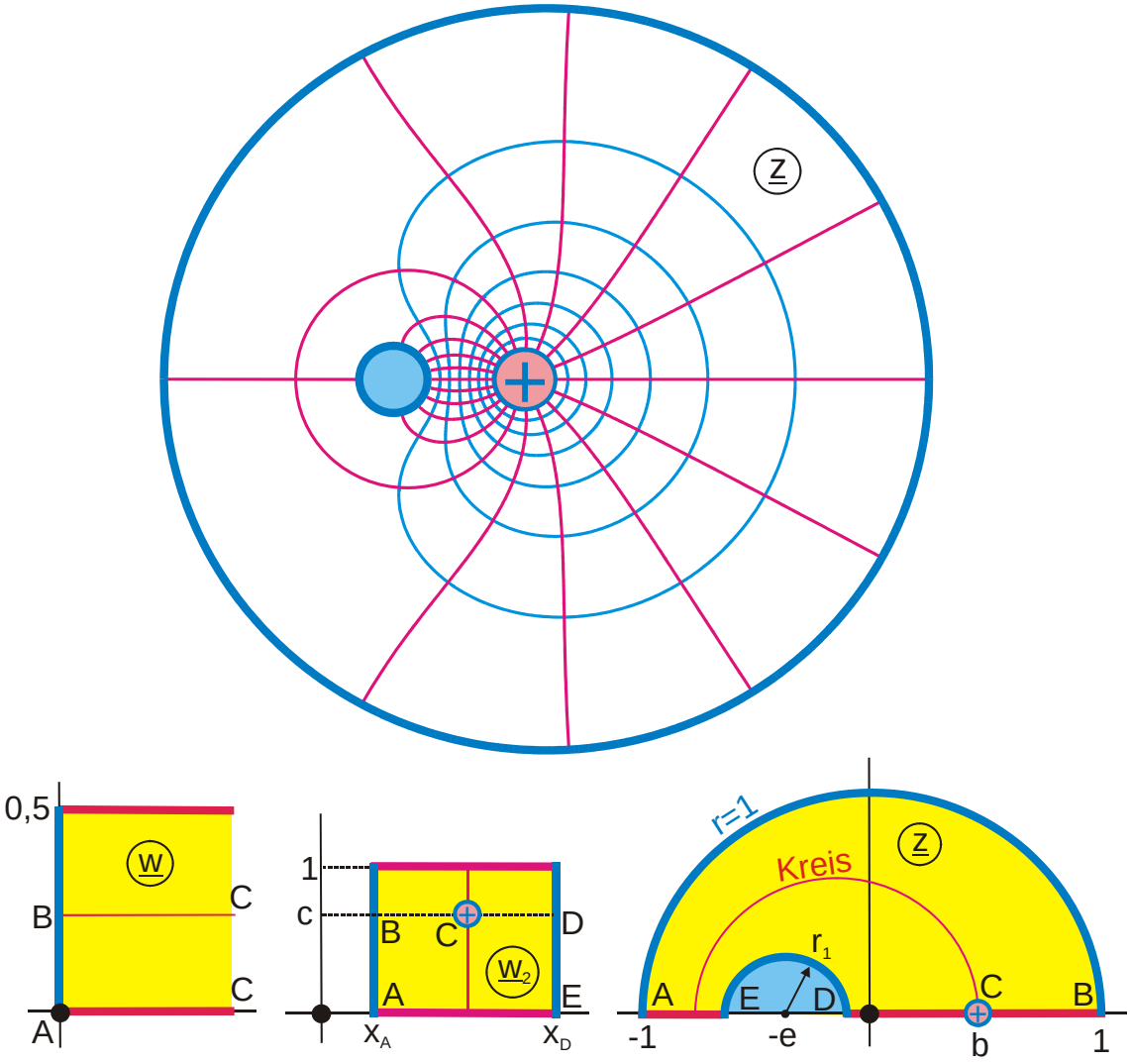


Abbildung P 1.14

$$z = a\tanh(w_2\pi) - d_2$$

$$w_1 = a_1\tanh(w\pi)$$

$$a = \sqrt{f^2 - r_1^2}\,/e$$

$$x_A = \frac{1}{2\pi}ar\sinh a$$

$$d_2 = \sqrt{a^2+1}$$

$$\tau = \frac{2}{x_D - x_A}$$

$0 \le u \le 0{,}3$

$$w_2 = x_A + \frac{F_a(w_1,k)}{K(k)}$$

$$f = \left(1 + r_1^2 - e^2\right)/2$$

gegeben: e, c, r_1

$$x_D = \frac{1}{2\pi}ar\sinh\frac{a}{r_1}$$

$$k_1 = \mathrm{sn}\{cK(k),k\}$$

$$k = \left[\frac{\vartheta_2(0,\tau)}{\vartheta_3(0,\tau)}\right]^2$$

$0 \le v \le 0{,}5$

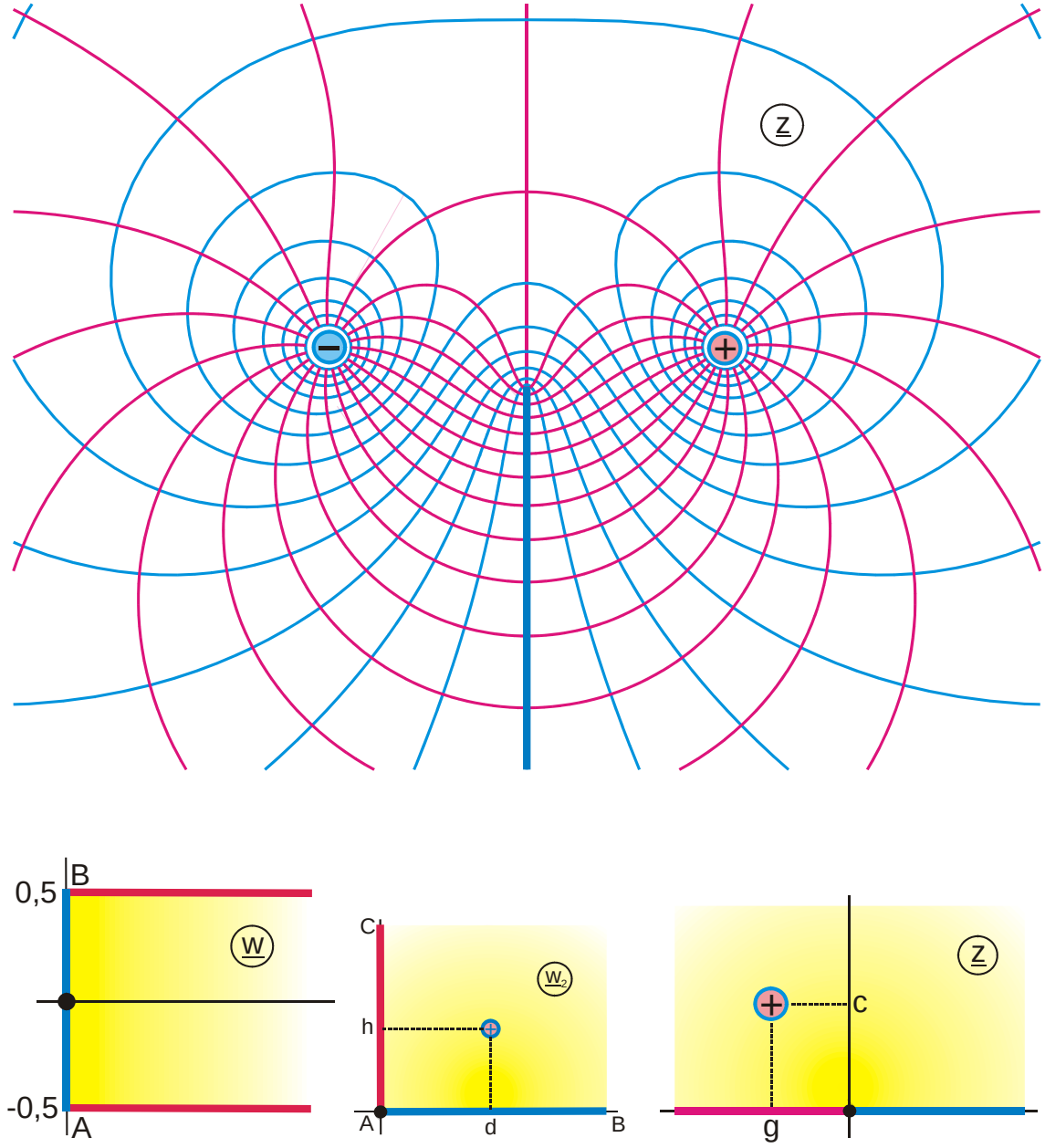


Abbildung P 1.15

$$z = w_2^{\,2}\exp(-j\pi/2)$$

$$w_2 = -j\left[\pm\sqrt{h^2\left(w_1^{\,2}-1\right)-d^2}+hw_1\right] \qquad w_1 = \tanh(\pi w)$$

$$d = \mathrm{Re}\left\{\sqrt{-g+jc}\right\} \qquad h = \mathrm{Im}\left\{\sqrt{-g+jc}\right\}$$

gegeben: g, c

$0 \le u \le 0{,}6$ $\qquad -0{,}5 \le v \le 0{,}5$

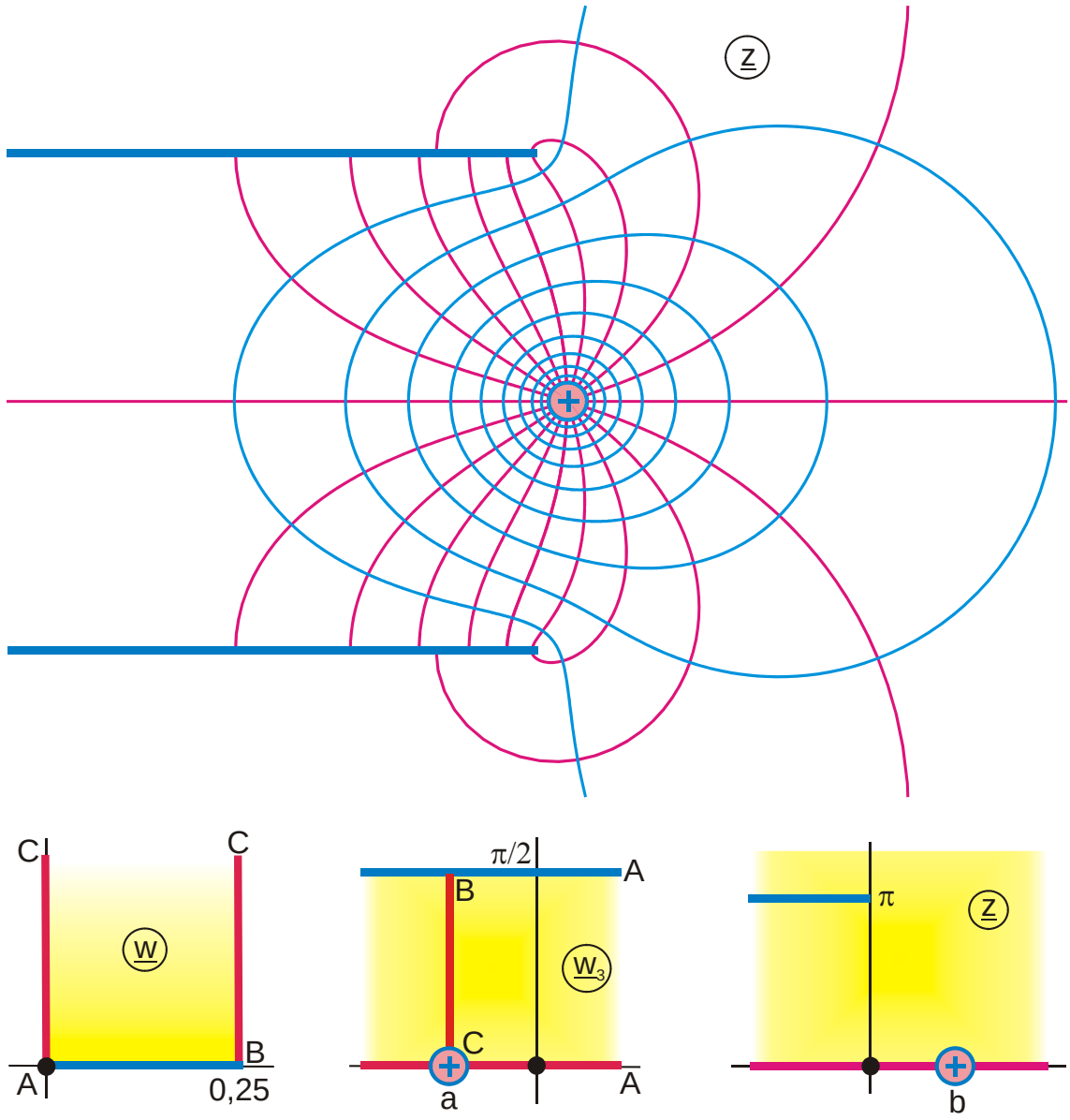


Abbildung P 1.16

$z = w_3\pi + \exp(w_3\pi) + 1$

$w_3 = 2w_2$

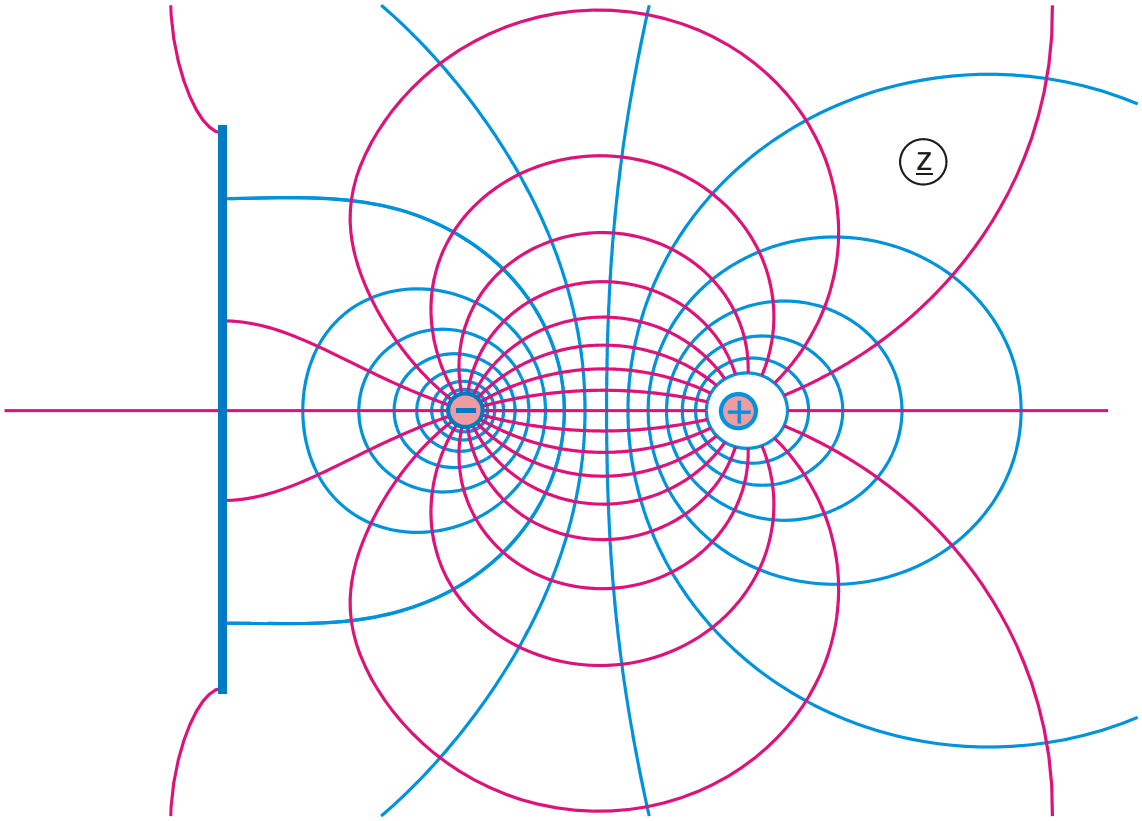
$w_2 = j\frac{\pi}{2} - w_1$ - a

$w_1 = \ln\tan(w\pi)$

b = 0 für a = 0,63923

$u \le 0{,}25$

$0 \le v \le 0{,}5$



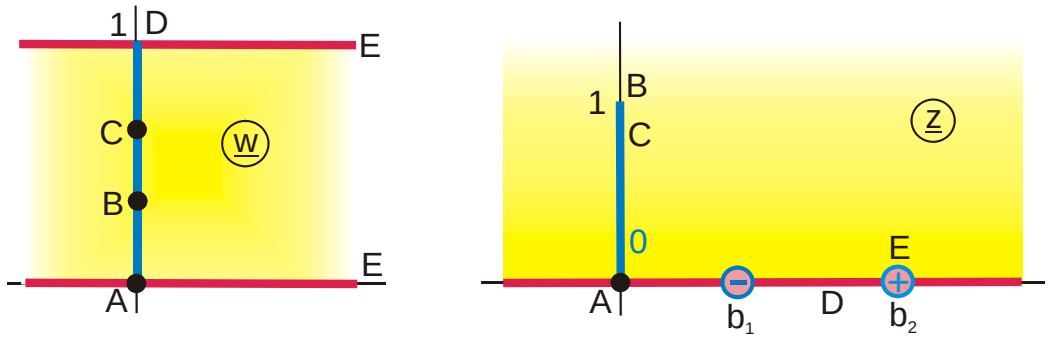


Abbildung P 2

$$z = -2j\frac{w_3}{w_3^{\,2}+1}$$

$$w_3 = -jw_2 + j\sqrt{w_2^{\,2} - a_1 a_2}$$

$$w_2 = \frac{a_1 - a_2}{2}\frac{w_1 + 1}{w_1 - 1}$$

$$w_1 = \exp(\pi w)$$

$$a_1 = \frac{1}{b_1} + \sqrt{\frac{1}{b_1^{\,2}} + 1}$$

$$a_2 = \frac{1}{b_2} + \sqrt{\frac{1}{b_2^{\,2}} + 1}$$

$-0{,}8 \le u \le 0{,}8$

$0 \le v \le 1$

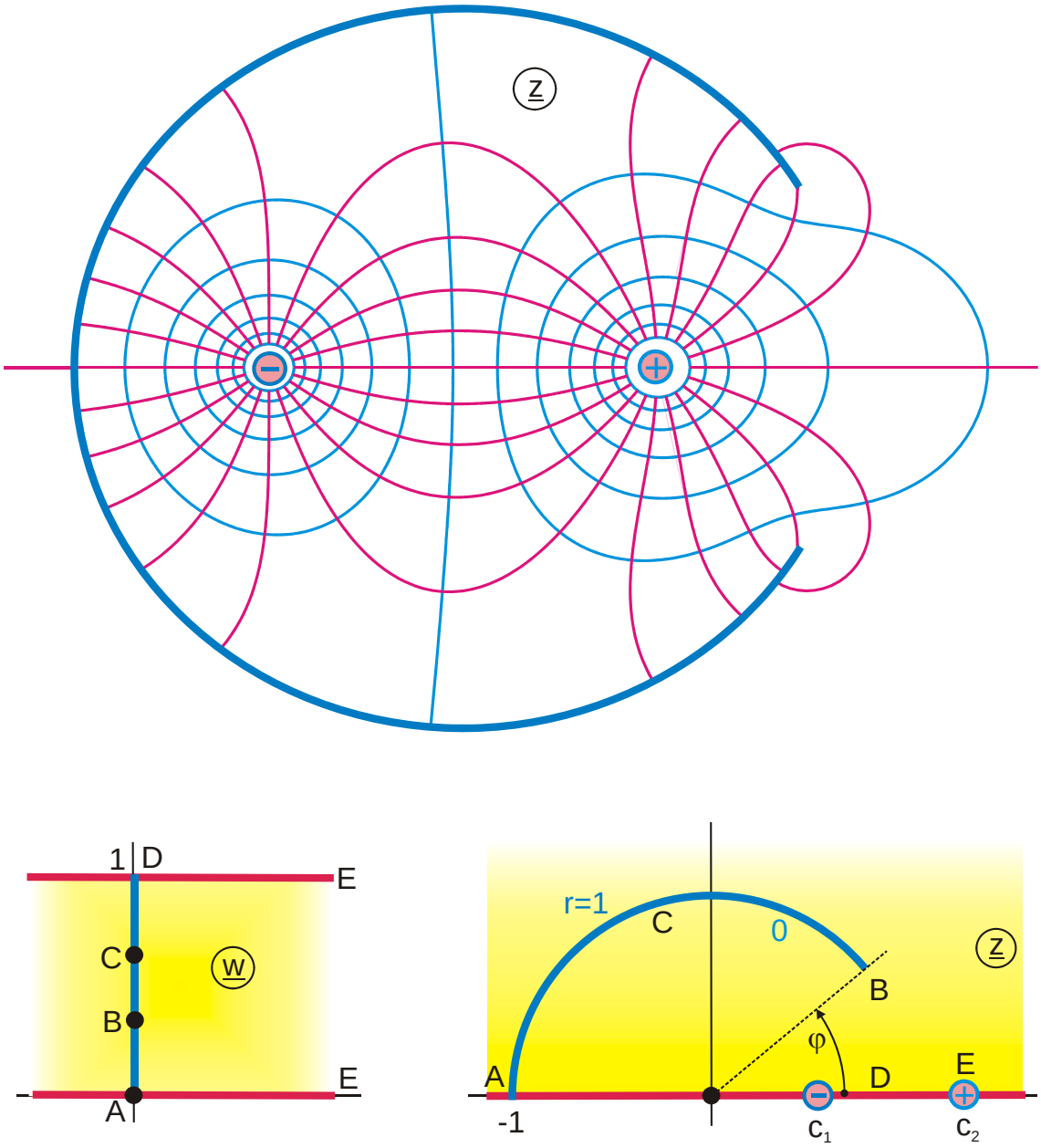


Abbildung P 2.1

$$z = \frac{w_4 + j}{w_4 - j}$$

$$w_4 = -2b\frac{w_3}{w_3^2 + 1}$$

$$w_3 = -jw_2 + j\sqrt{w_2^2 - a_1 a_2}$$

$$w_2 = \frac{a_1 - a_2}{2}\frac{w_1 + 1}{w_1 - 1}$$

$$w_1 = \exp(\pi w)$$

$$b = 1/\tan(\varphi/2)$$

$$b_1 = \frac{1 + c_1}{1 - c_1}$$

$$b_2 = \frac{1 + c_2}{1 - c_2}$$

$$a_1 = \frac{b}{b_1} + \sqrt{\left(\frac{b}{b_1}\right)^2 + 1}$$

$$a_2 = \frac{b}{b_2} + \sqrt{\left(\frac{b}{b_2}\right)^2 + 1}$$

$-0{,}7 \le u \le 0{,}7$

$0 \le v \le 1$

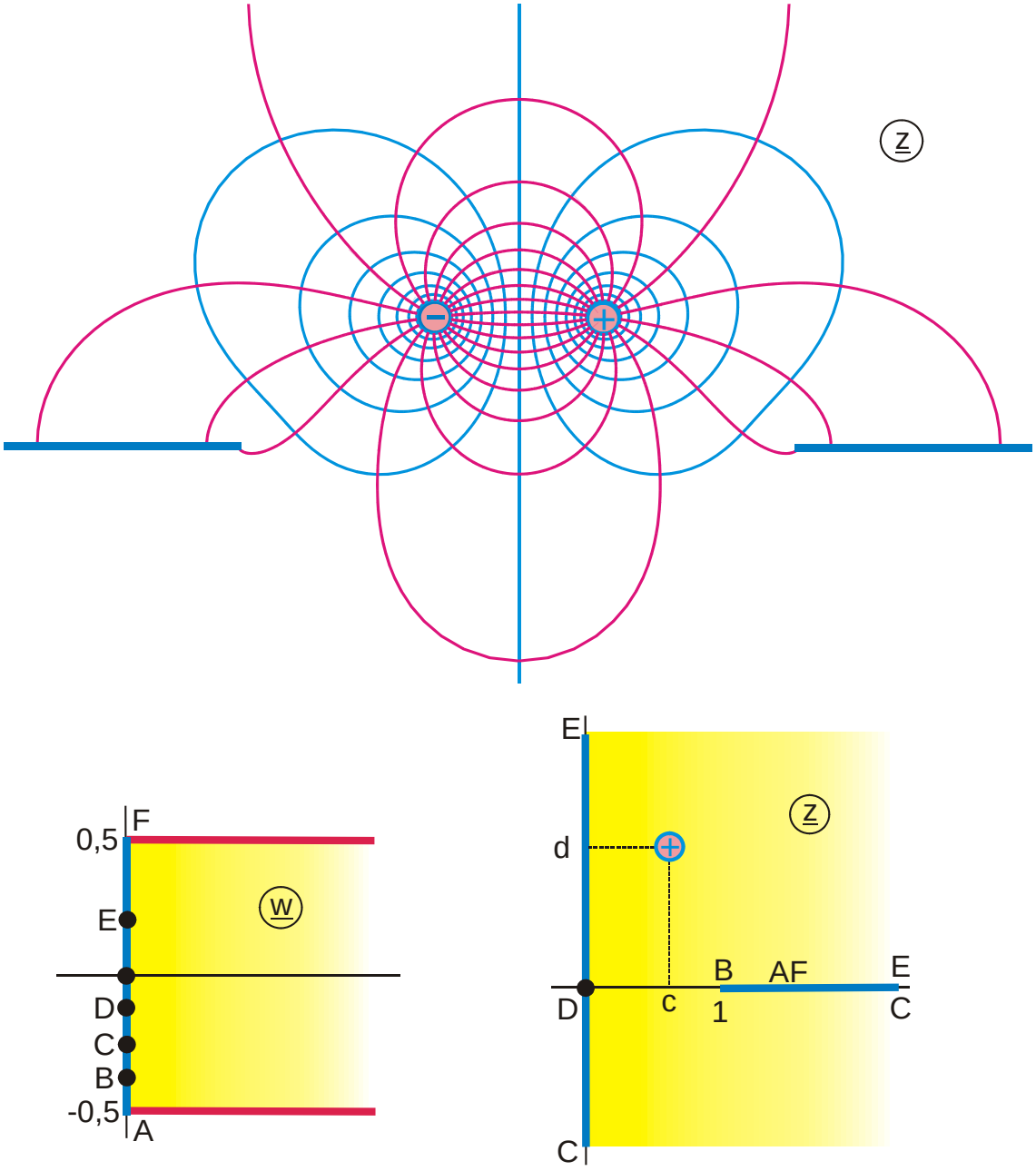


Abbildung P 2.2

$$z = \sin w_2$$

$$w_2 = w_1 + jb$$

$$w_1 = \arctan\left[\tan\frac{a\pi}{2}\tanh(w\pi)\right]$$

$$v_E = \frac{1-a}{2}$$

$$a = \frac{\pi}{2}\,\mathrm{Re}\{\arcsin(c+jd)\}$$

$$b = \mathrm{Im}\{\arcsin(c+jd)\}$$

$0 \le u \le 0{,}35$

$-0{,}5 \le v \le 0{,}5$

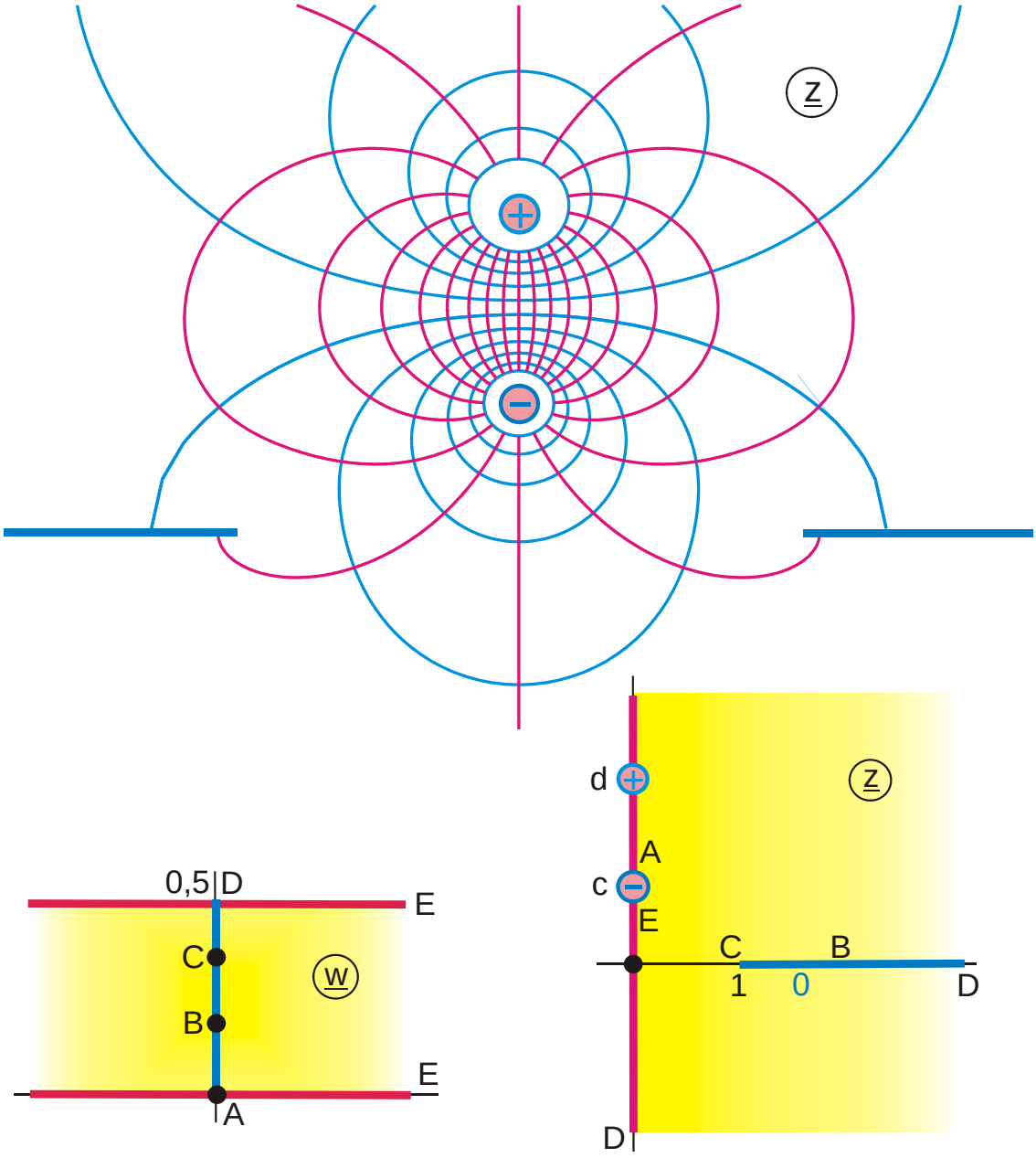


Abbildung P 2.3

$z = \sin w_2$

$w_2 = j(b - w_1)$

$w_1 = \operatorname{ar}\sinh\left[a \tanh(w\pi)\right]$

$v_B = \frac{1}{\pi}\arctan\frac{1}{a}$

$b = \frac{1}{2}\{\operatorname{arsinh} d + \operatorname{ar}\sinh c\}$

$h = \frac{1}{2}\{\operatorname{arsinh} d - \operatorname{ar}\sinh c\}$

$a = \sinh h$

$-0{,}25 \le u \le 0{,}25$

$0 \le v \le 0{,}5$

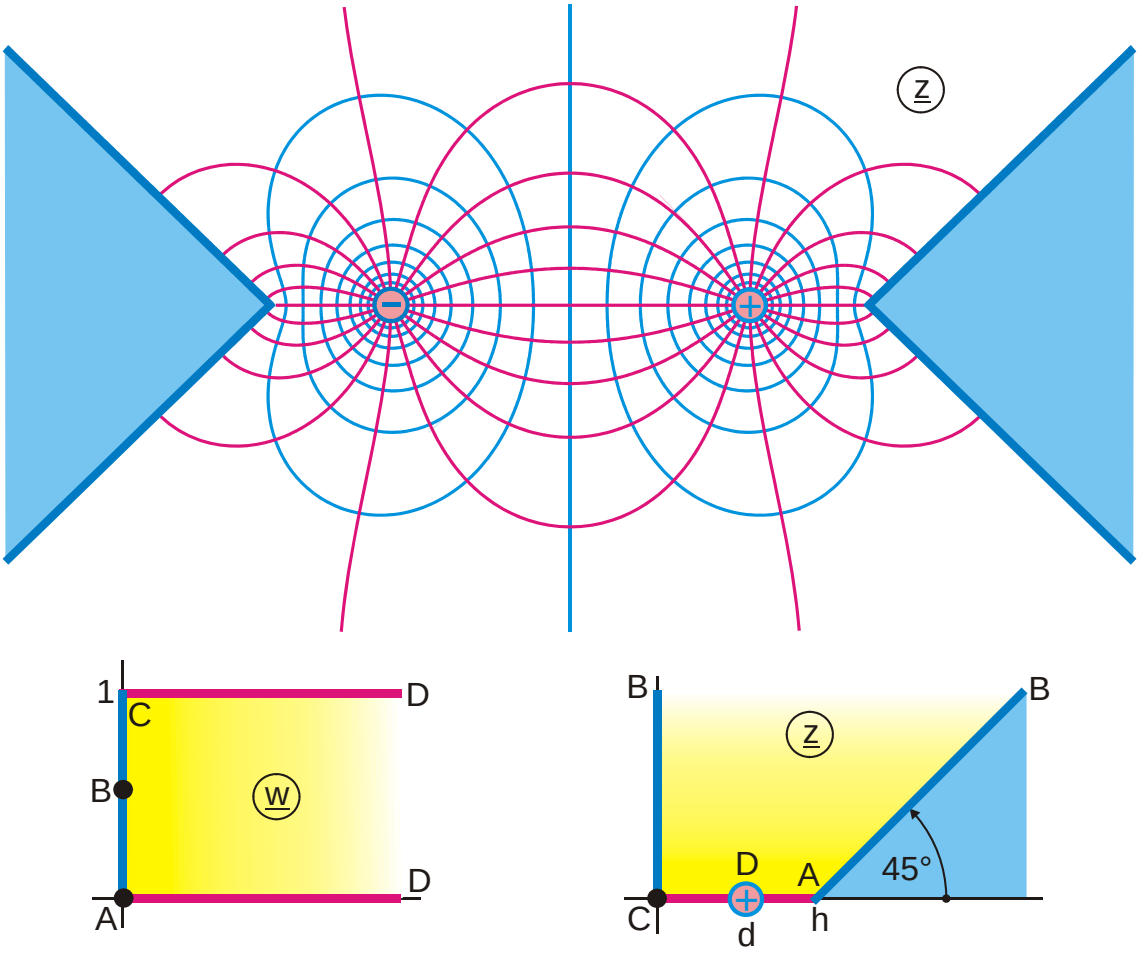


Abbildung P 2.4

$$z = B_a\left(\sqrt{w_2}, k\right) - jh$$

$$w_2 = 1 - \sqrt{\frac{w_1}{b+1}}$$

$$w_1 = 1 + b + \frac{b+1+(b+1)\cosh(w\pi)}{b-1-(b+1)\cosh(w\pi)}$$

$$b = \frac{(1-c)^2}{1-(1-c)^2}$$

$$k = \frac{1}{\sqrt{2}}$$

gegeben: a

$$c = sn^2\left[aK(k), k\right]$$

$$v_B = \frac{1}{\pi}\arccos\frac{b-1}{b+1}$$

$$h = 2\,E(k) - K(k)$$

$0 \le u \le 0{,}8$

$0 \le v \le 1$

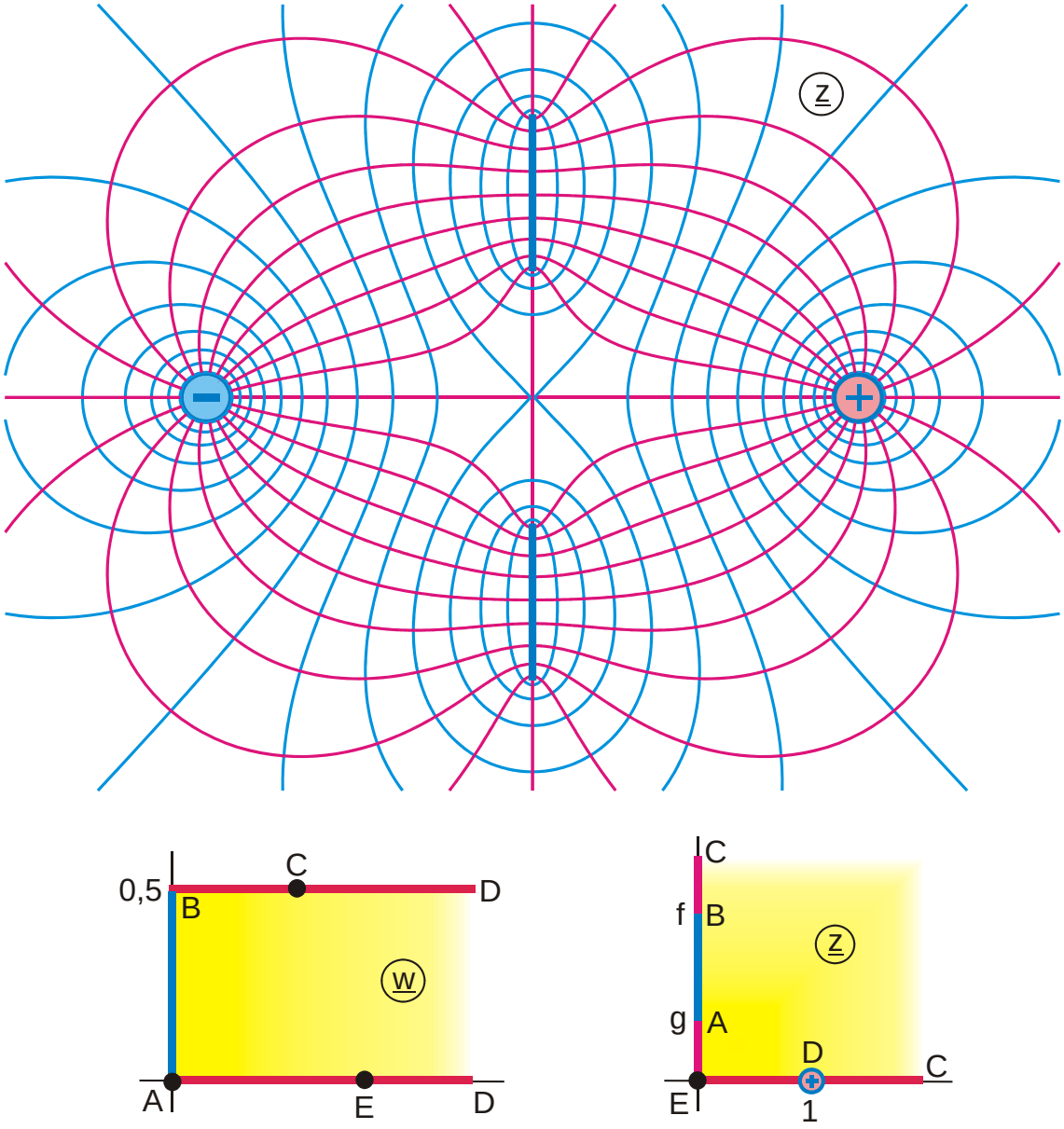


Abbildung P 2.5

$z = \exp(w_1)$

$w_1 = ar\tanh\left\{(a+b)\tanh^2(w\pi) - b\right\} - h$

b = 1/tanh d

a = tanh h

h = ln (1/f)

d = ln (f/g)

$u_E = \frac{1}{\pi} \operatorname{ar\,tanh} \sqrt{\frac{b-1}{b+a}}$

$u_C = \frac{1}{\pi} \operatorname{ar\,tanh} \sqrt{\frac{b+a}{b+1}}$

gegeben: f, g

b > 1 und a < 1

0 ≤ u ≤ 0,7

0 ≤ v ≤ 0,5

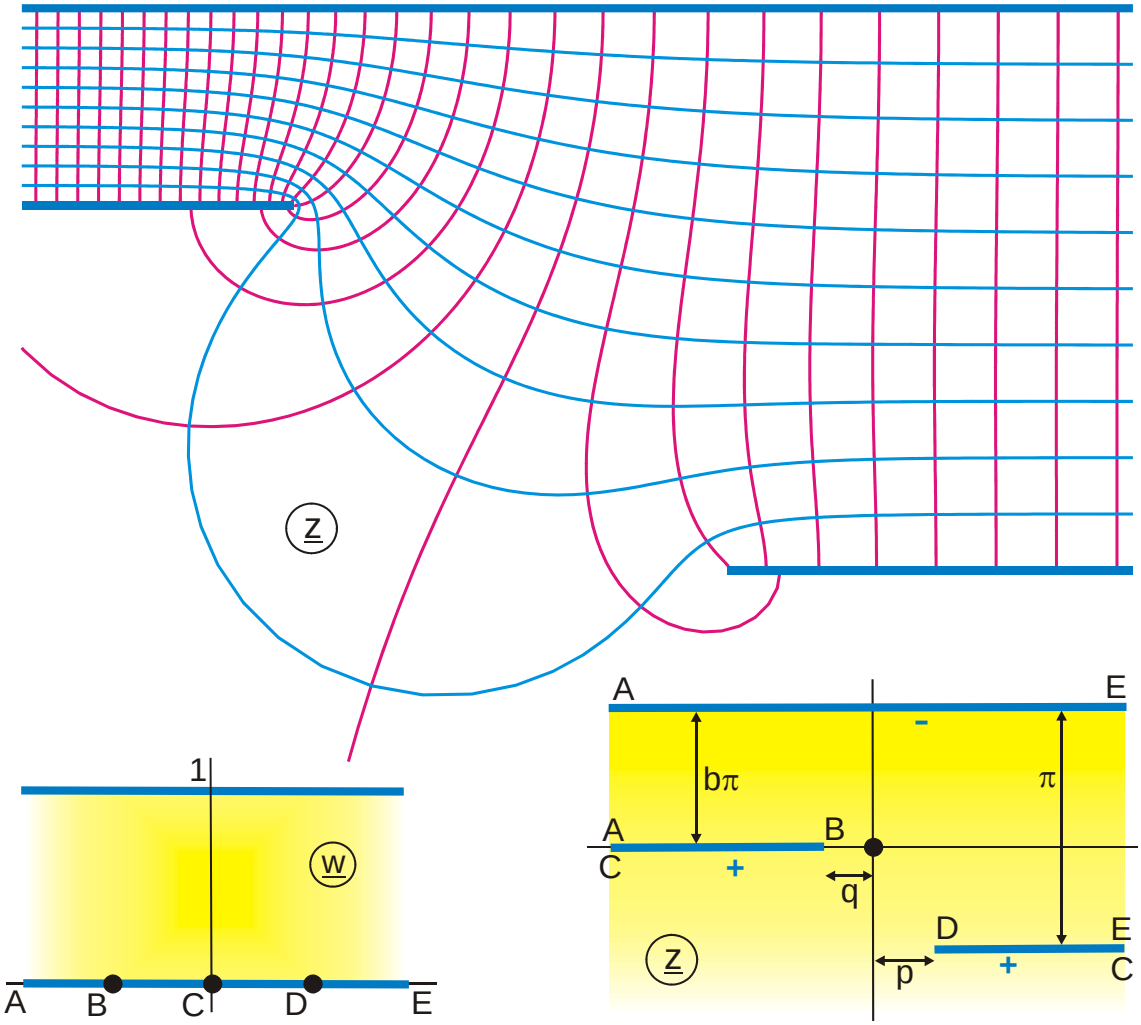


Abbildung P 3

$$z = \frac{1}{2-a}\left\{ w\pi + (1-a)\ln\left[\exp(w\pi)-1\right] - j\pi(1-a) + s + \frac{c}{\exp(w\pi)-1}\right\}$$

$s = (2 - a)\ln(2 - a) - (1 - a)\ln(1 - a)$ $\qquad a = 2 - 1/b$

$$u_B = \frac{1}{\pi}\ln\left\{\frac{3 + c - a - \sqrt{a^2 + c^2 - 2ac + 6c - 2a + 1}}{2(2-a)}\right\} \qquad -3 \le u \le 2$$

$$u_D = \frac{1}{\pi}\ln\left\{\frac{3 + c - a + \sqrt{a^2 + c^2 - 2ac + 6c - 2a + 1}}{2(2-a)}\right\} \qquad 0 \le v \le 1$$

$$p = \frac{1}{2-a}\left\{ \pi u_D + (1-a)\ln\left[\exp(\pi u_D)-1\right] + s + \frac{c}{\exp(\pi u_D)-1}\right\}$$

$$q = \frac{1}{2-a}\left\{ \pi u_B + (1-a)\ln\left[1-\exp(\pi u_B)\right] + s + \frac{c}{\exp(\pi u_B)-1}\right\}$$

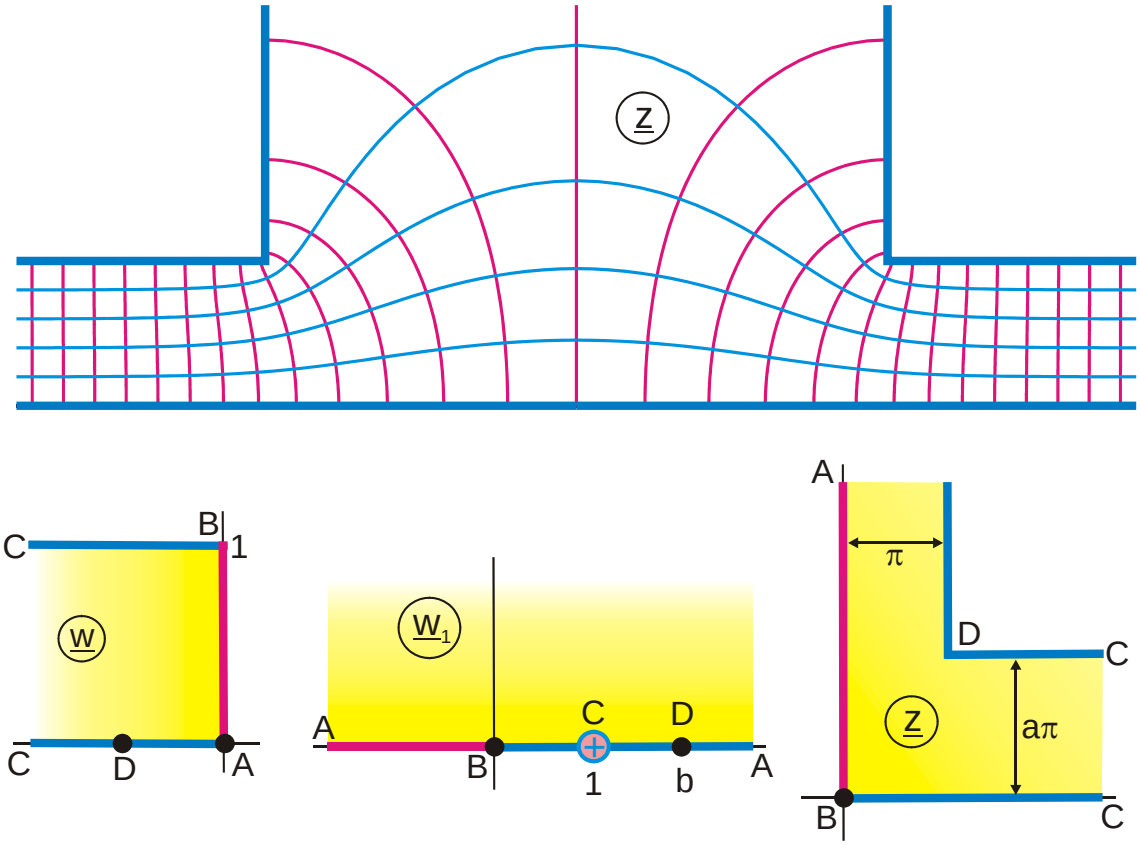


Abbildung P 3.1

$$z = \arccos\frac{b-2w_1}{b} + a\ ar\cosh\frac{b+w_1(b-2)}{b(1-w_1)}$$

$$w_1 = \left(\frac{1+\exp(w\pi)}{1-\exp(w\pi)}\right)^2$$

$$u_D = -\frac{2}{\pi}\operatorname{artanh}\frac{1}{\sqrt{b}}$$

$$b = 1 + a^2$$

$-3 \le u \le 0$ $\qquad$ $0 \le v \le 1$

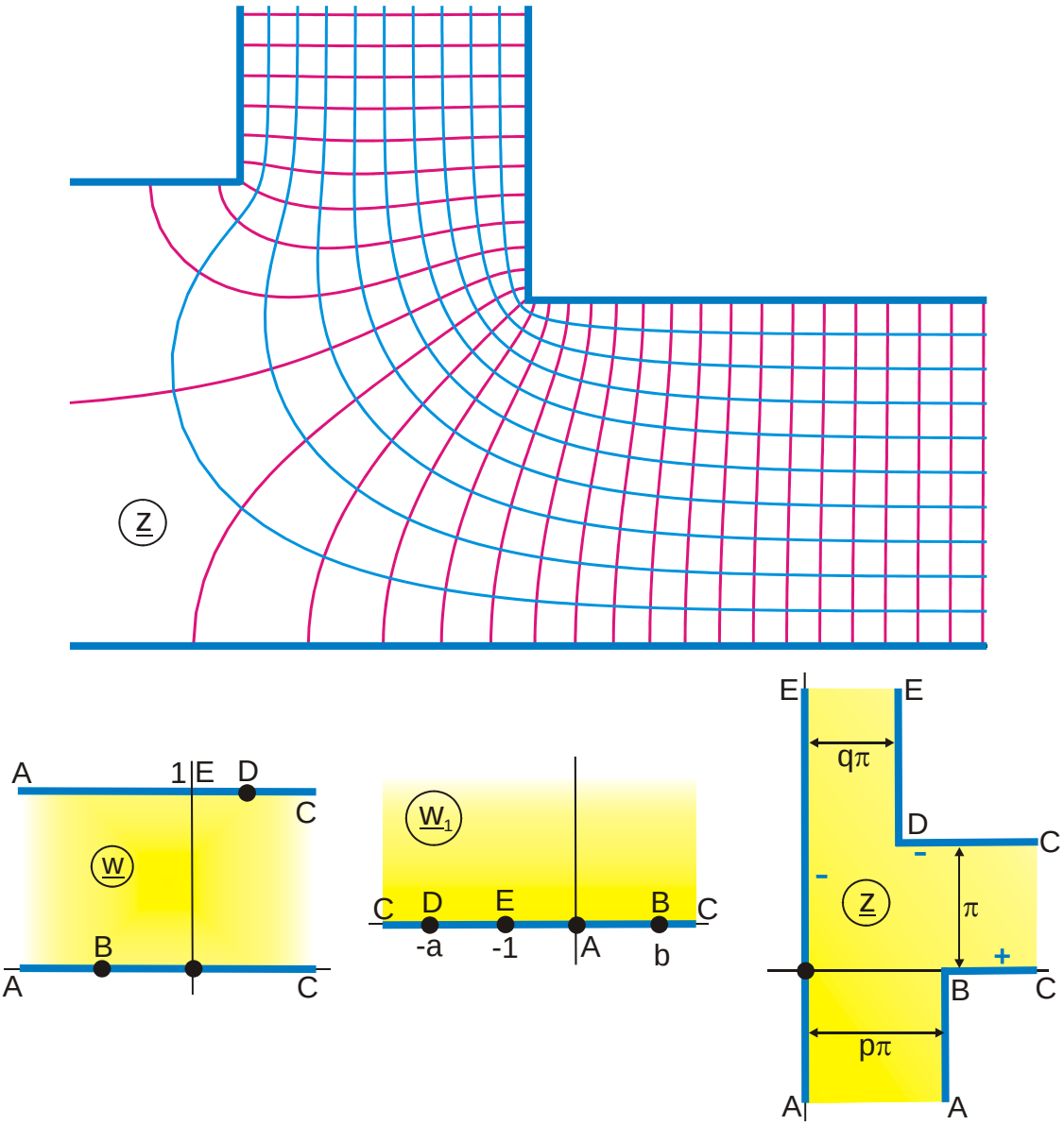


Abbildung P 3.2

$$z = \operatorname{arcosh} w_2 + p \arccos w_3 + q \arccos w_4$$

$$w_2 = \frac{2w_1 + a - b}{a + b}$$

$$w_4 = \frac{2(a-1)(b+1) + (b-a+2)(w_1+1)}{(a+b)(w_1+1)}$$

$$w_3 = \frac{(a-b)w_1 - 2ab}{(a+b)w_1}$$

$$w_1 = \exp(w\pi)$$

$$u_D = \frac{1}{\pi} \ln a$$

$$u_B = \frac{1}{\pi} \ln b \qquad p = \sqrt{ab} \qquad q = \sqrt{(b+1)(a-1)}$$

$$-2 \le u \le 1{,}5 \qquad 0 \le v \le 1$$

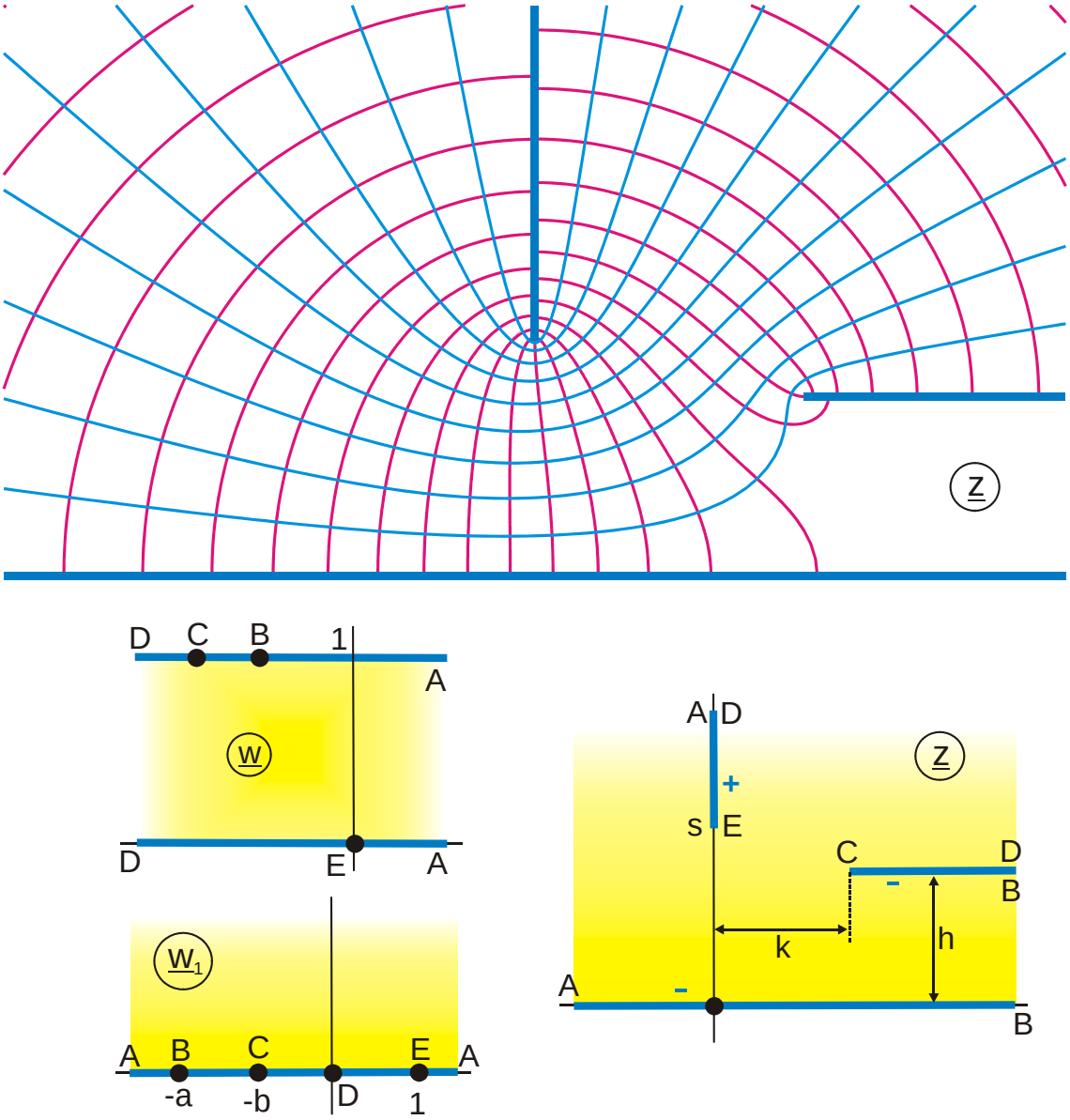


Abbildung P 3.3

$$z = j\left(h + \sqrt{w_1} + \frac{f}{\sqrt{w_1}} - g\arctan\sqrt{\frac{w_1}{a}}\right)$$

$$w_1 = \exp(w\pi)$$

$$g = \frac{(a-b)(a+1)}{a\sqrt{a}}$$

$$f = \frac{b}{a}$$

$$s = 1 + h + f - g\arctan\sqrt{1/a}$$

$$h = \frac{\pi g}{2}$$

$$k = \sqrt{b}/a - \sqrt{b} + g\ \mathrm{ar\,tanh}\sqrt{f}$$

gegeben: a, b, mit a > b

$$-1{,}5 \le u \le 1{,}5$$

$$0 \le v \le 1$$

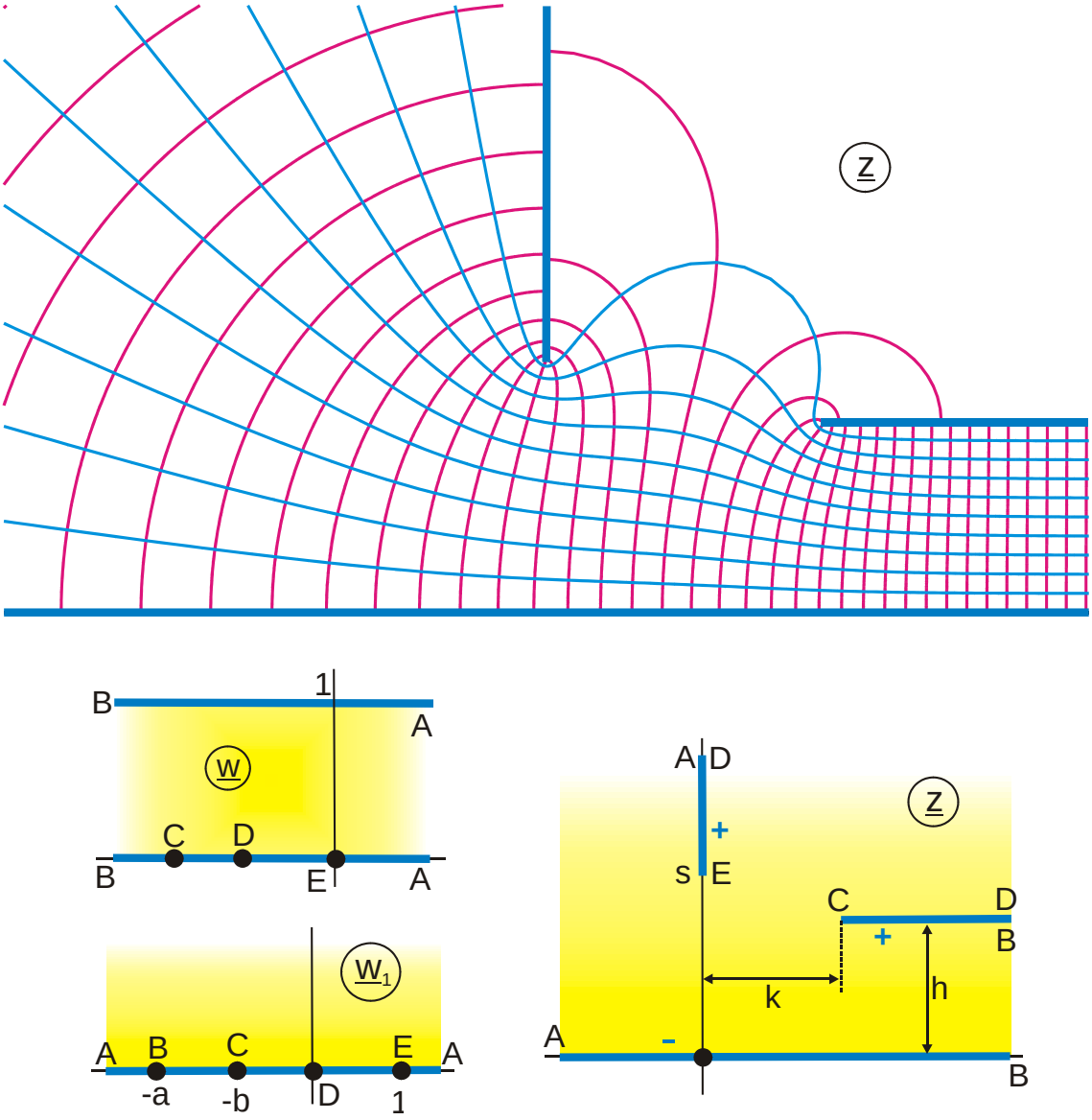


Abbildung P 3.4

$$z = j\left(h + \sqrt{w_1} + \frac{f}{\sqrt{w_1}} - g \arctan\sqrt{\frac{w_1}{a}} \right)$$

$$w_1 = \exp(w\pi) - a$$

$$g = \frac{(a-b)(a+1)}{a\sqrt{a}}$$

$$f = \frac{b}{a}$$

$$s = 1 + h + f - g \arctan\sqrt{1/a}$$

$$h = \frac{\pi g}{2}$$

$$k = \sqrt{b}/a - \sqrt{b} + g \operatorname{ar\,tanh}\sqrt{f}$$

gegeben: a, b, mit a > b

$$-2{,}5 \le u \le 1{,}5$$

$$0 \le v \le 1$$

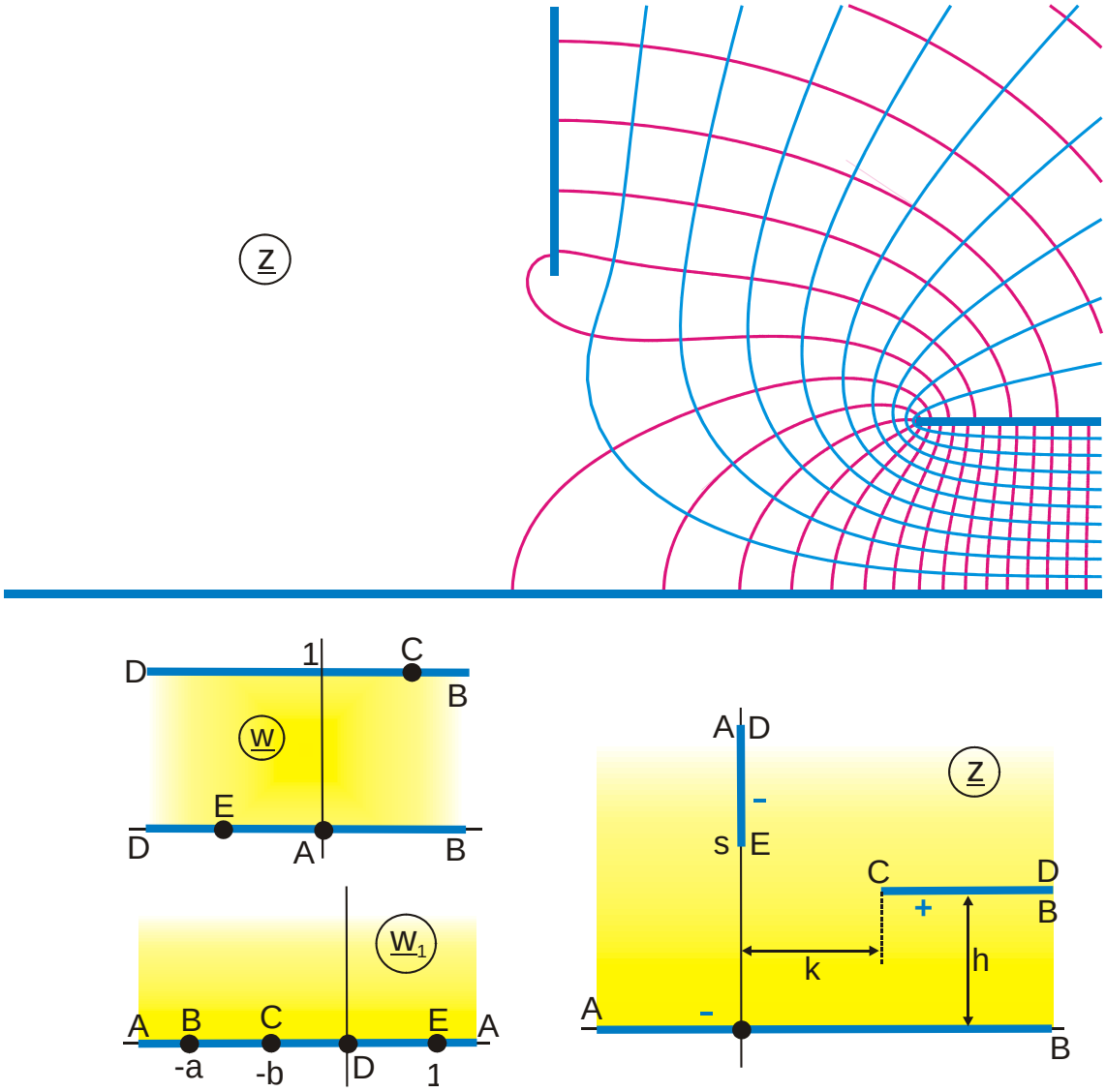


Abbildung P 3.5

$$z = j\left(h + \sqrt{w_1} + \frac{f}{\sqrt{w_1}} - g \arctan\sqrt{\frac{w_1}{a}} \right)$$

$$w_1 = \frac{a \exp(w\pi)}{1 - \exp(w\pi)}$$

$$g = \frac{(a-b)(a+1)}{a\sqrt{a}}$$

$$f = \frac{b}{a}$$

$$s = 1 + h + f - g \arctan\sqrt{1/a}$$

$$h = \frac{\pi g}{2}$$

$$k = \sqrt{b}/a - \sqrt{b} + g \operatorname{ar\,tanh}\sqrt{f}$$

gegeben: a, b, mit a > b

$$-1{,}05 \le u \le 3$$

$$0 \le v \le 1$$

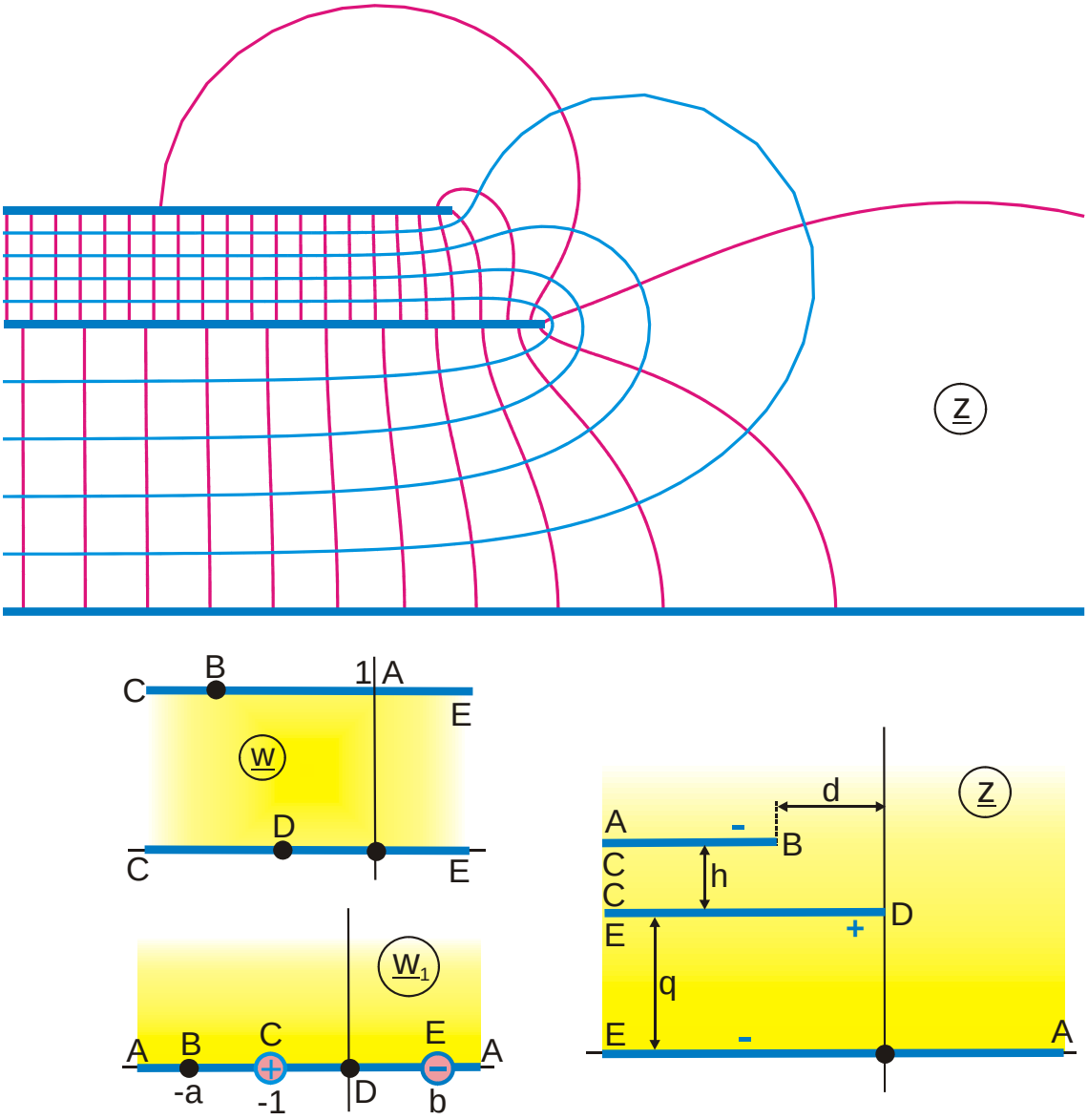


Abbildung P 3.6

$$z = w_1 + f_1 \ln\left[w_1^2 + w_1(1-b) - b\right] + f_2\pi(j - w_1) - p - jq$$

$$f_1 = \frac{a+b-1}{2}$$

$$w_1 = \frac{1}{2}\left[b - 1 + (b+1)\tanh\frac{w\pi}{2}\right]$$

$$f_2 = \frac{1+b^2-a(1-b)}{2(1+b)}$$

$$p = (f_1 + f_2)\ln b$$

$$q = (f_1 + f_2)\pi$$

$$p_1 = -a + f_1 \ln\left[a^2 - a(1-b) - b\right] + f_2 \ln\frac{a+b}{a-1}$$

$$q_1 = 2\pi f_1$$

$$h = q_1 - q$$

$$d = p_1 - p$$

$$-4{,}5 \le u \le 2{,}5$$

$$0 \le v \le 1$$

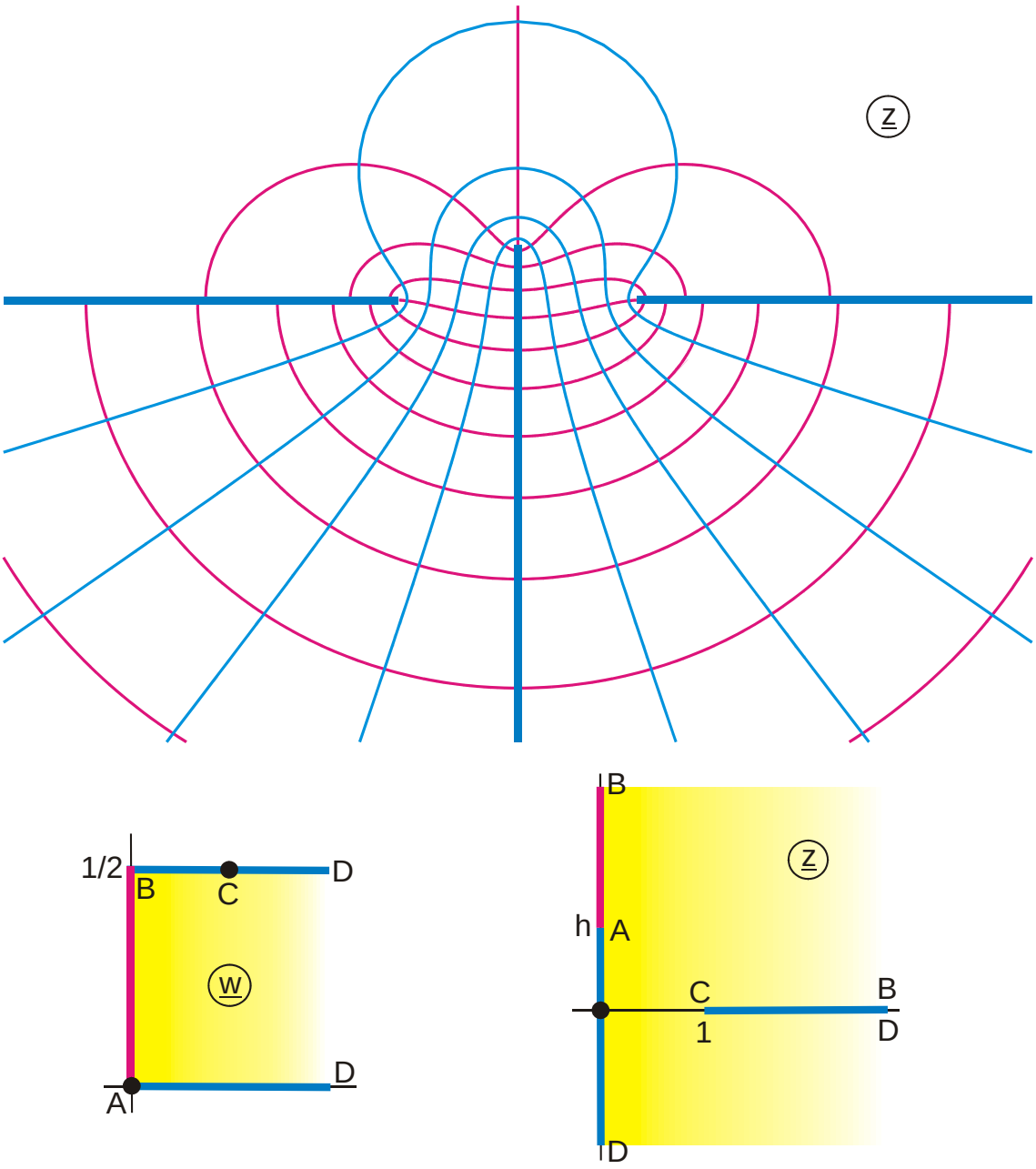


Abbildung P 3.7

$z = \sin w_2$ $\qquad$ $w_2 = j(a - w_1)$

$w_1 = \ln\cosh(w\pi)$ $\qquad$ $u_C = \frac{1}{\pi} ar\sinh(e^a)$

$a = ar\sinh h$

$0 \le u \le 1{,}5$ $\qquad$ $0 \le v \le 0{,}5$

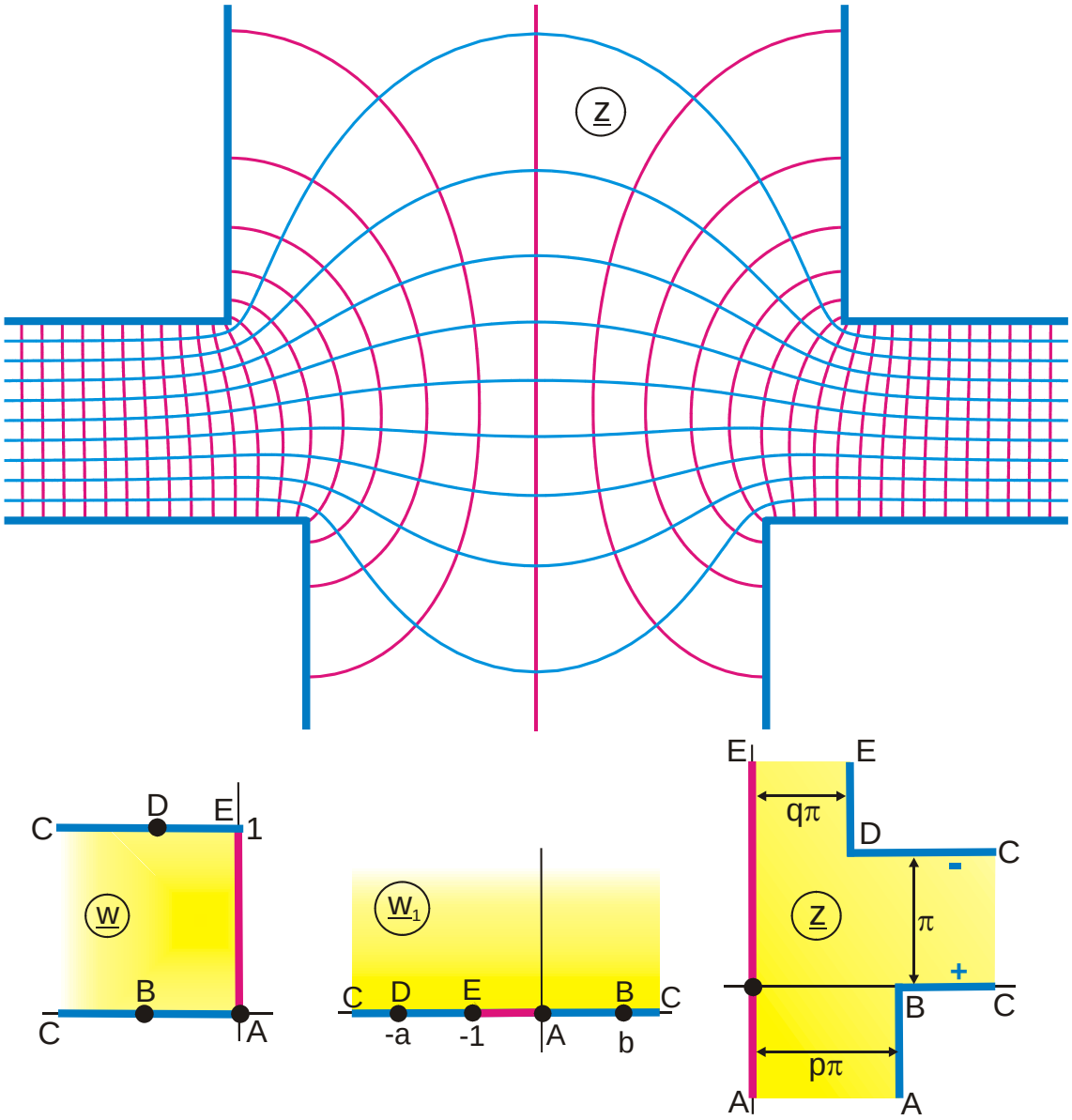


Abbildung P 3.8

$$z = \operatorname{arcosh} w_2 + p \arccos w_3 + q \arccos w_4$$

$$w_2 = \frac{2w_1 + a - b}{a + b}$$

$$w_4 = \frac{2(a-1)(b+1) + (b-a+2)(w_1+1)}{(a+b)(w_1+1)}$$

$$w_3 = \frac{(a-b)w_1 - 2ab}{(a+b)w_1}$$

$$w_1 = -\frac{\cosh(w\pi)+1}{2}$$

$$p = \sqrt{ab}$$

$$q = \sqrt{(b+1)(a-1)}$$

$-2 \le u \le 0$

$0 \le v \le 1$

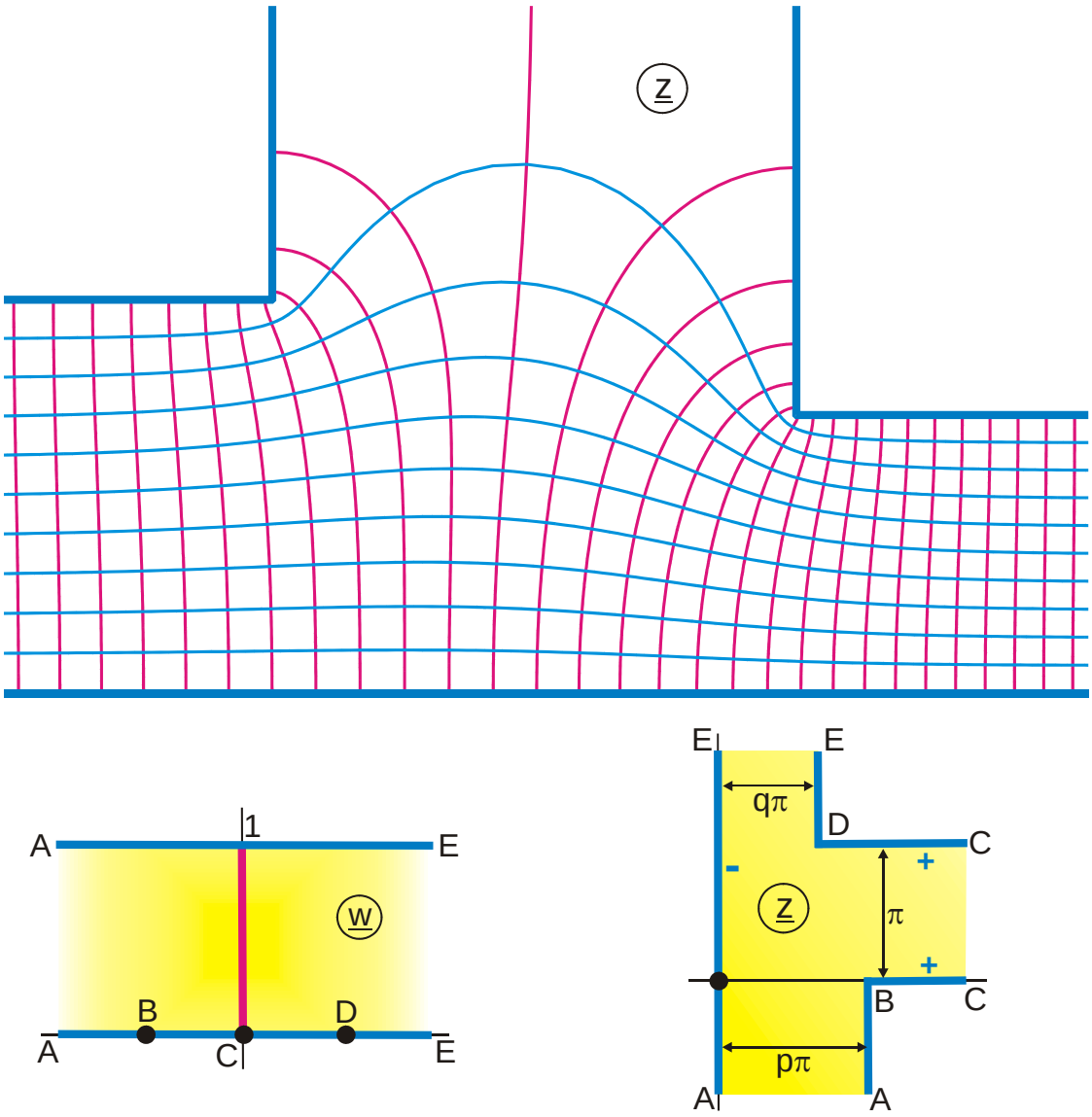


Abbildung P 3.9

$$z = \left(\operatorname{arcosh} w_2 + p \arccos w_3 + q \arccos w_4\right) \exp(j\pi/2)$$

$$w_2 = \frac{2w_1 + a - b}{a + b}$$

$$w_4 = \frac{2(a-1)(b+1) + (b-a+2)(w_1+1)}{(a+b)(w_1+1)}$$

$$w_3 = \frac{(a-b)w_1 - 2ab}{(a+b)w_1}$$

$$w_1 = \frac{\tanh(w\pi) - 1}{2}$$

$$p = \sqrt{ab}$$

$$q = \sqrt{(b+1)(a-1)}$$

$-2 \le u \le 2$

$0 \le v \le 1$

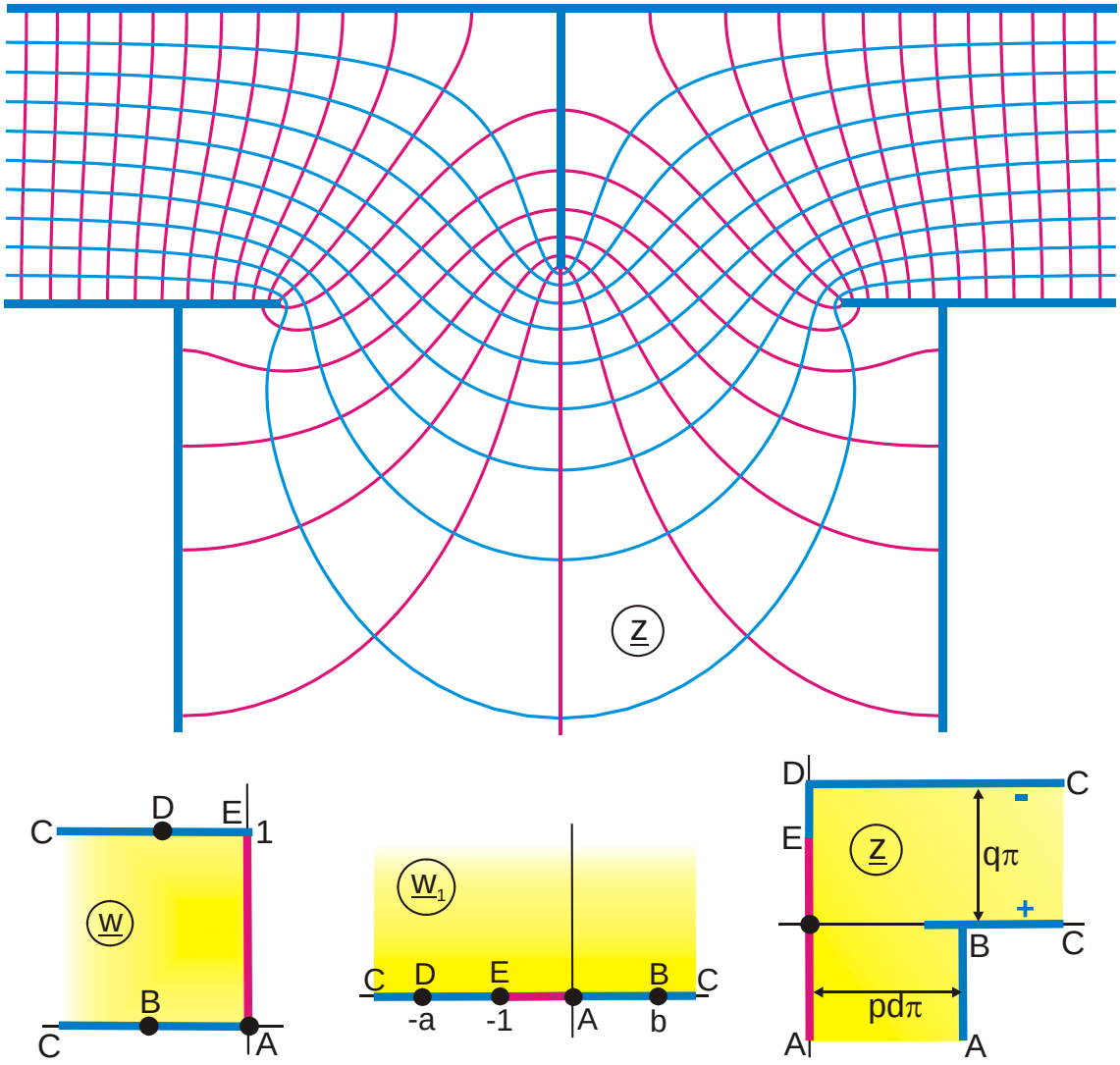


Abbildung P 3.10

$$z = c\,\operatorname{arcosh} w_2 + p\,d\,\arccos w_3$$

$$w_2 = \frac{2w_1 + a - b}{a + b}$$

$$w_3 = \frac{(a-b)w_1 - 2ab}{(a+b)\,w_1}$$

$$w_1 = -\frac{\cosh(w\pi) + 1}{2}$$

$$p = \sqrt{ab}$$

gegeben: a, b, c, d

$-2 \le u \le 0$

$0 \le v \le 1$

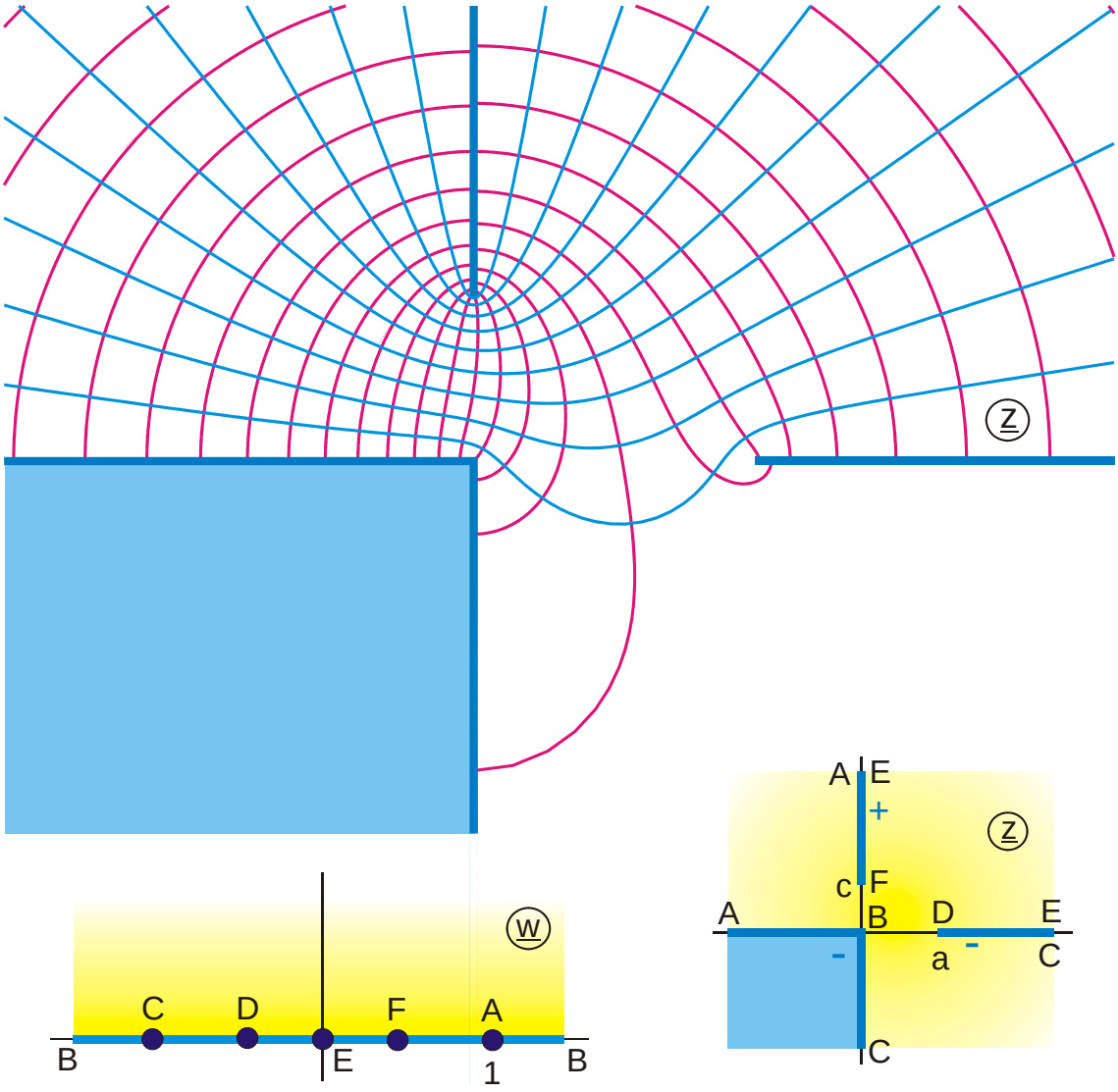


Abbildung P 3.11

$$w_0 = \frac{\tanh(w\pi)+1}{2}$$

$$w_1 = \sqrt{1-1/w_0} \qquad w_2 = F_a(w_1, k)$$

$$w_3 = K(k) + jK'(k) - w_2 \qquad w_4 = \mathrm{sn}\, w_3 \ \mathrm{cn}\, w_3 \ \mathrm{dn}\, w_3$$

$$z = \frac{1}{w_4} \qquad \text{gegeben: k} \qquad u_C = \frac{k^2}{k^2-1} = -\left(\frac{k}{k'}\right)^2$$

$$-1{,}2 \le u \le 1{,}5 \qquad 0 \le v \le 1$$

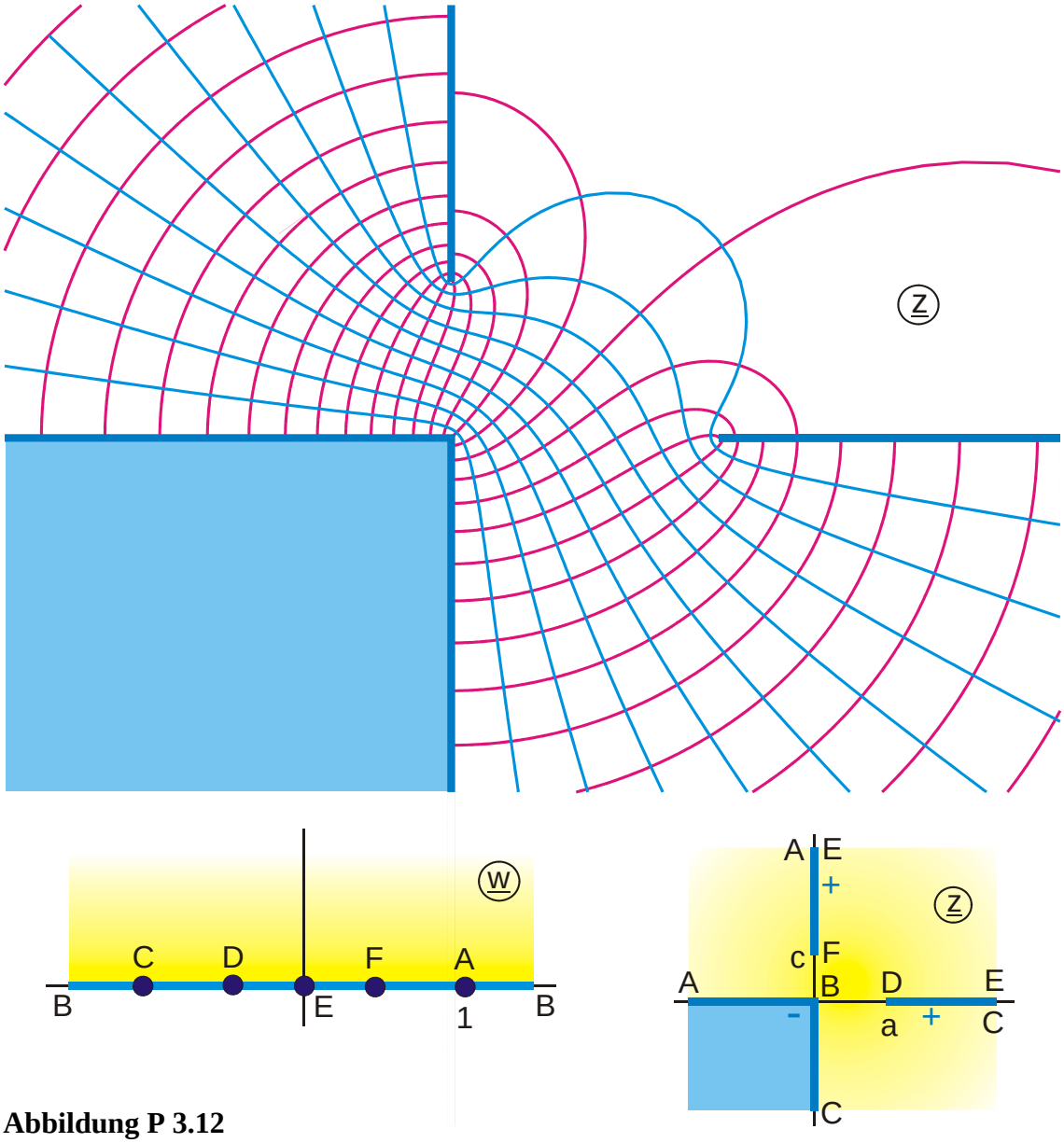


Abbildung P 3.12

$$w_0 = \frac{\tanh(w\pi)-1}{2}\left(1-u_C\right)+1$$

$$w_1 = \sqrt{1-1/w_0}$$

$$w_2 = F_a(w_1, k)$$

$$w_3 = K(k) + jK'(k) - w_2$$

$$w_4 = \mathrm{sn}\, w_3 \;\mathrm{cn}\, w_3 \;\mathrm{dn}\, w_3$$

$$z = \frac{1}{w_4}$$

gegeben: k

$$u_C = \frac{k^2}{k^2-1} = -\left(\frac{k}{k'}\right)^2$$

$-1{,}5 \le u \le 1{,}5$

$0 \le v \le 1$

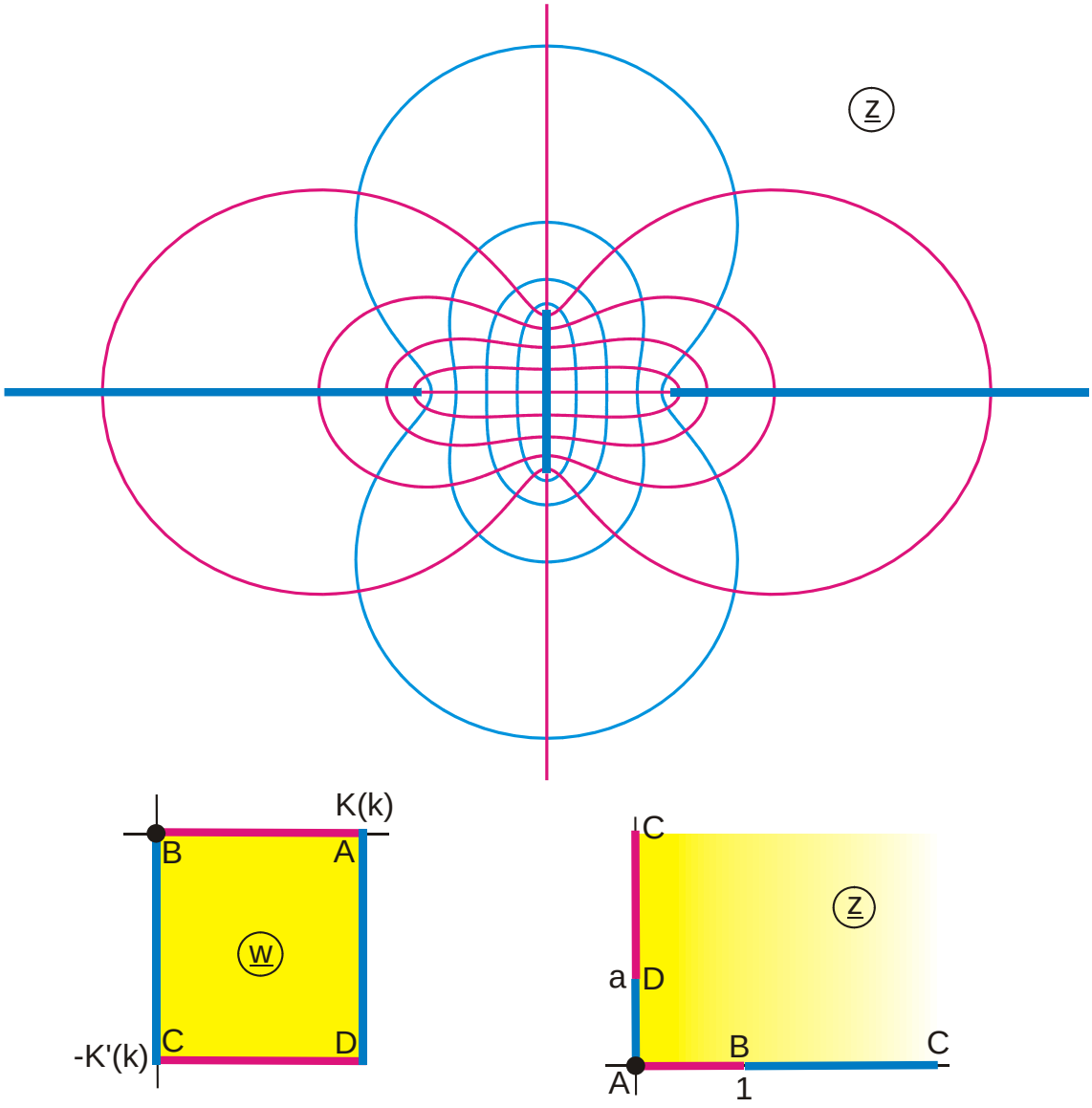


Abbildung P 4

$$z = \mathrm{cn}\left(w, k\right)$$

$$k = \frac{1}{\sqrt{1+a^2}}$$

$0 \le u \le K(k)$ $\qquad$ $-K'(k) \le v \le 0$

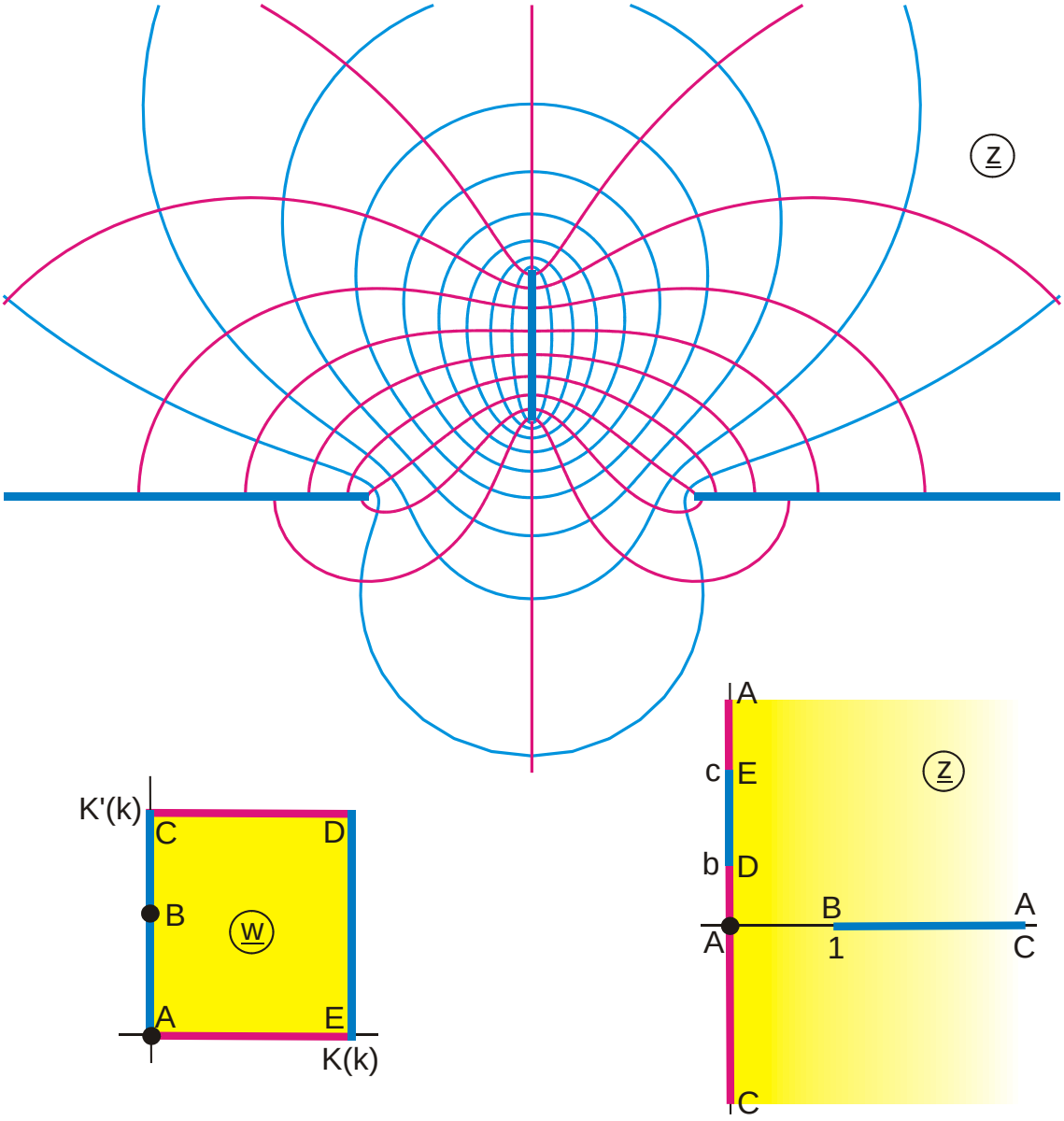


Abbildung P 4.1

$z = \sin w_2$

$w_2 = j(a - w_1)$

$w_1 = \ln \mathrm{sn}(w, k)$

$a = ar\sinh c$

$d = a - ar\sinh b$

$k = e^{-d}$

$0 \le \mathrm{u} \le \mathrm{K(k)}$

$0 \le \mathrm{v} \le \mathrm{K'(k)}$

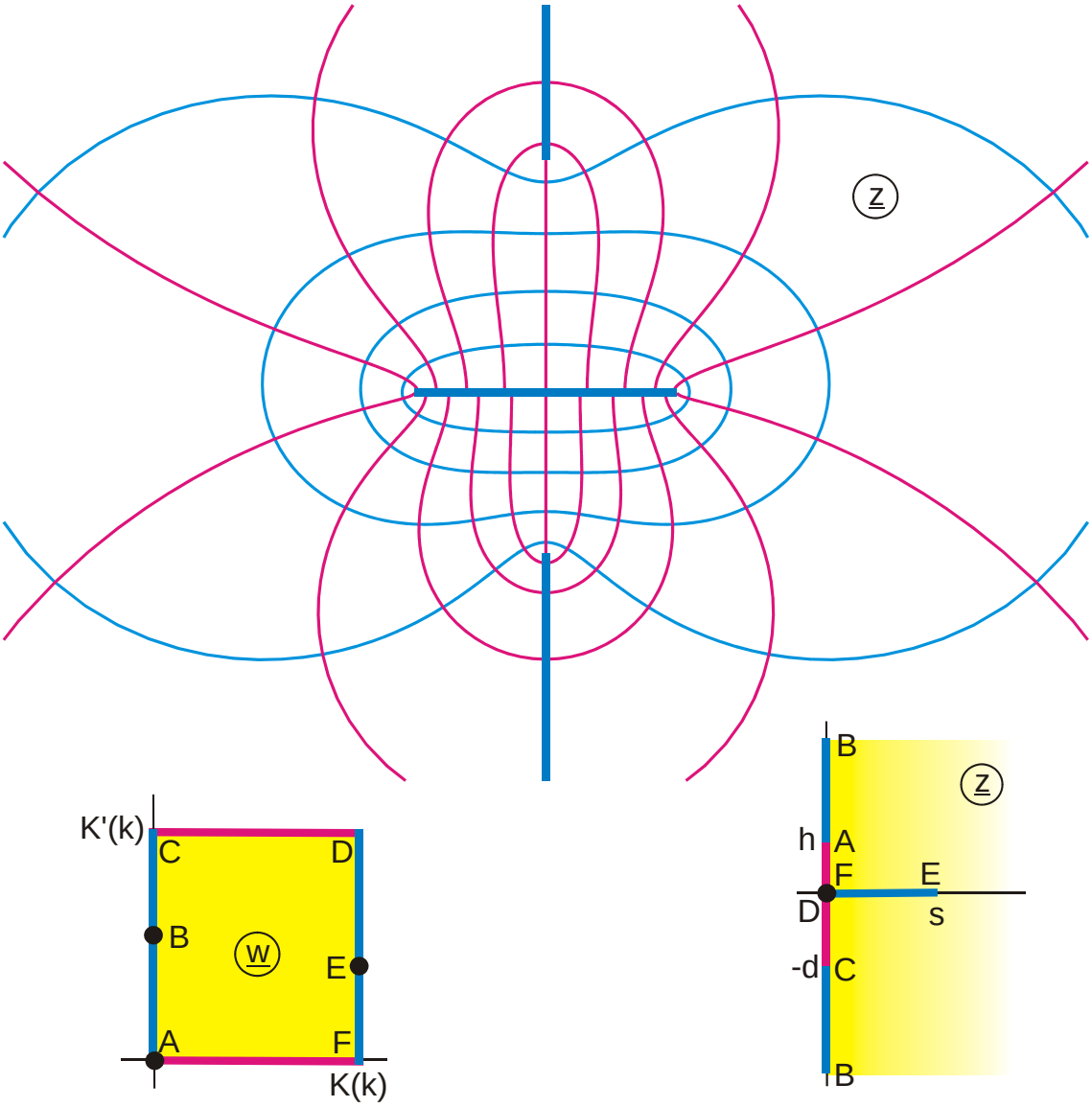


Abbildung P 4.2

$$z = \frac{\sqrt{k}}{2}\{\mathrm{sn}(w + ja,k) - \mathrm{sn}(w - ja,k)\}$$

$$a = \mathrm{Im}\, F_a\left(\frac{jh}{\sqrt{k}},k\right)$$

$$v_E = F_a\left(\sqrt{\frac{1+k^2\,\mathrm{sn}^2(ja,k)}{2-k'^2+2k^2\,\mathrm{sn}^2(ja,k)}},k'\right)$$

$$s = \frac{\sqrt{k}}{2}\{\mathrm{sn}(K(k) + jv_E + ja,k) - \mathrm{sn}(K(k) + jv_E - ja,k)\}$$

$$h = \sqrt{k}\,\frac{\mathrm{sn}[a,k']}{\mathrm{cn}[a,k']}$$

$d = 1/h$

gegeben: k, h

$0 \le u \le K(k)$

$0 \le v \le K'(k)$

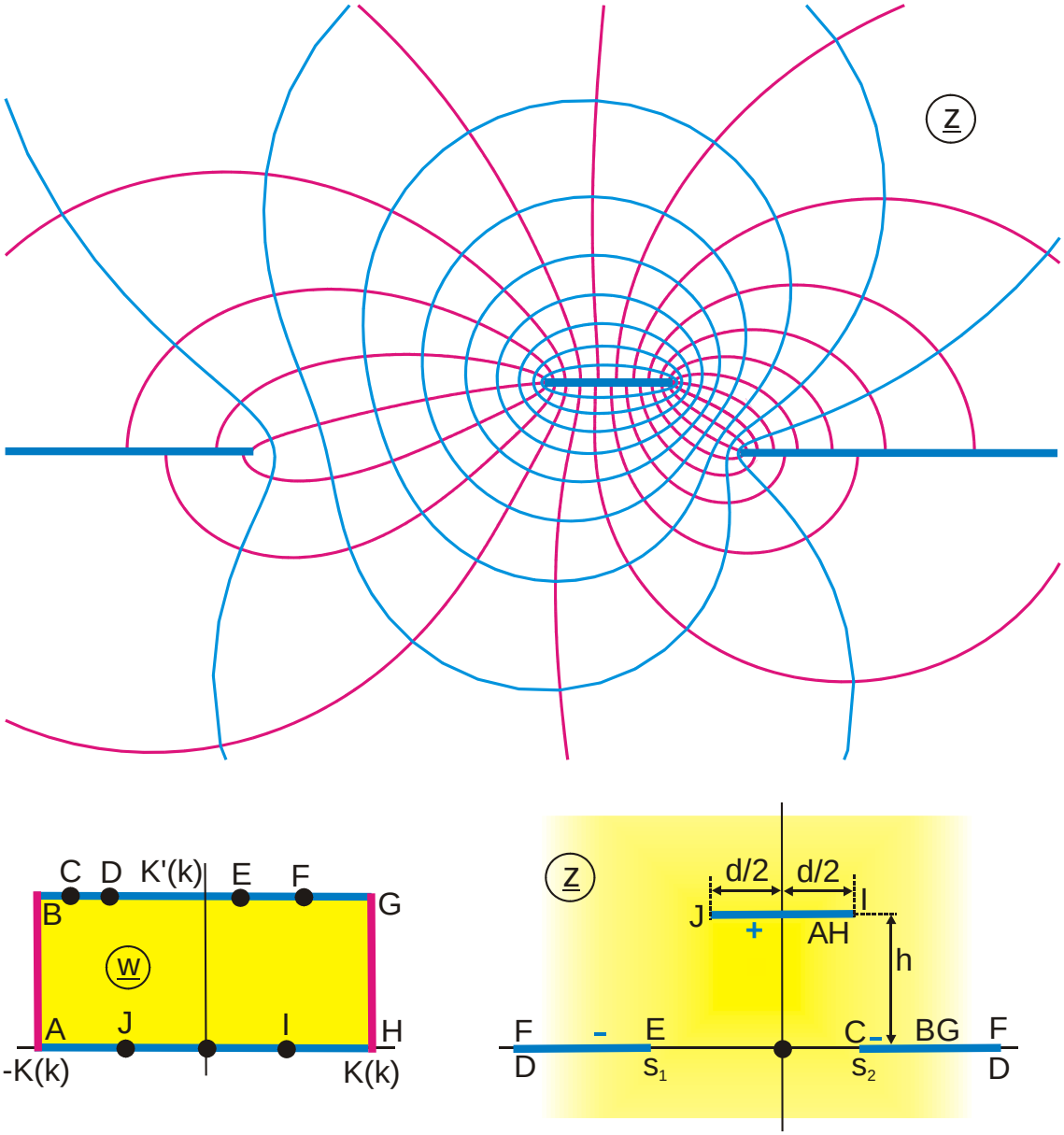


Abbildung P 4.3

$$z = aZ_e\left(w-\sigma,k\right) - Z_e\left(w+\sigma,k\right)$$

$$h = \frac{\pi}{2K(k)}\left(a-1\right) \qquad 0 < \sigma < K(k)$$

$$u_D = -\sigma \qquad u_F = \sigma$$

$$s_1 = s_2 \quad für \quad \sigma = K(k)/2$$

$$-K(k) \le u \le K(k) \qquad 0 \le v \le K'(k)$$

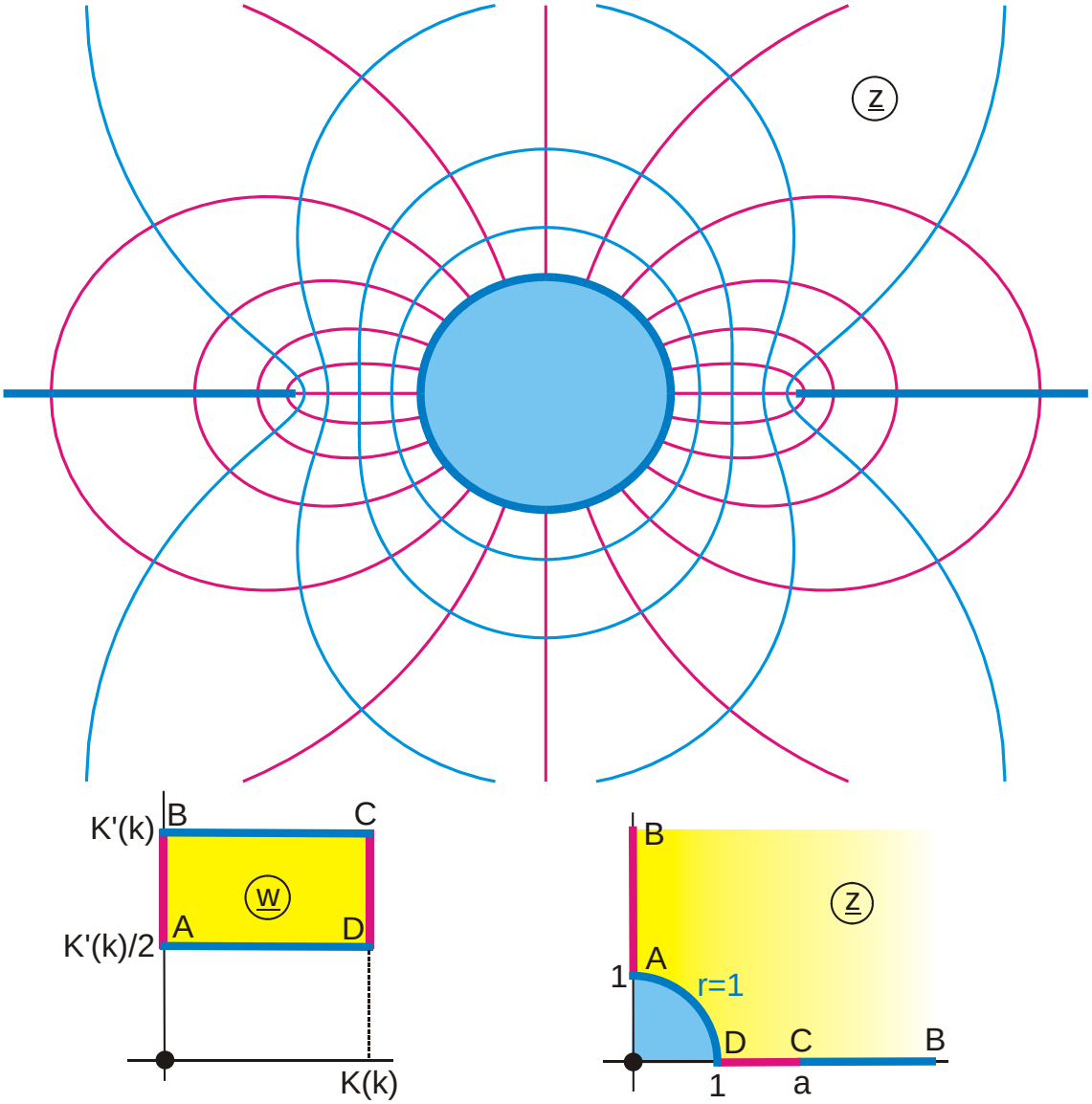


Abbildung P 4.4

$$z = \frac{1}{\sqrt{k}} \operatorname{sn}(w,k)$$

$$k = \frac{1}{a^2}$$

$0 \le u \le K(k)$ $\qquad$ $K'(k)/2 \le v \le K'(k)$

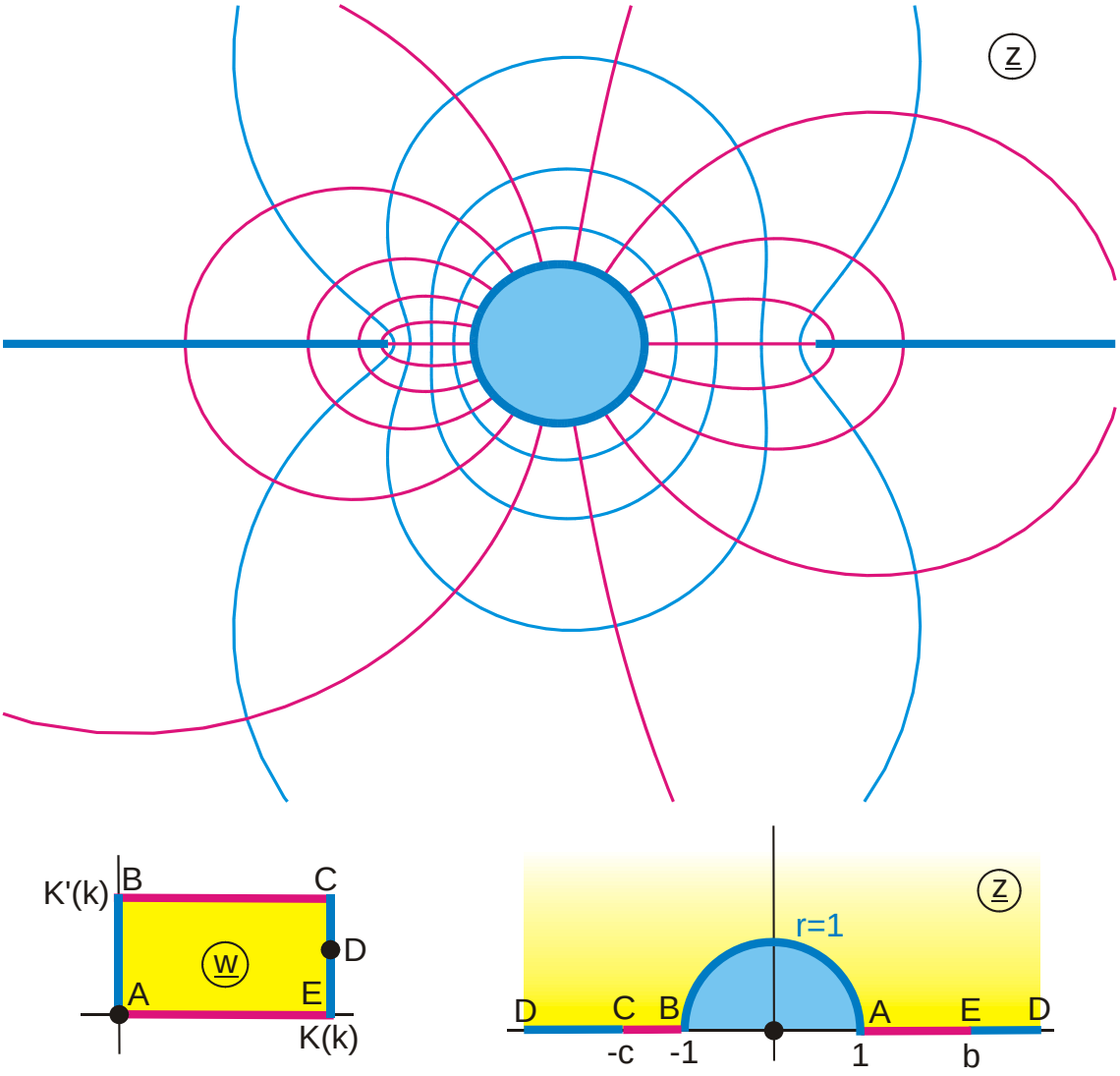


Abbildung P 4.5

$$z = \frac{1 + a\,\mathrm{sn}(w,k)}{1 - a\,\mathrm{sn}(w,k)}$$

$$a = \frac{b-1}{b+1} \qquad k = a\frac{c-1}{c+1}$$

$$v_D = \mathrm{Im}\,F_a\left(1/a, k\right)$$

$0 \le u \le K(k)$ $\qquad$ $0 \le v \le K'(k)$

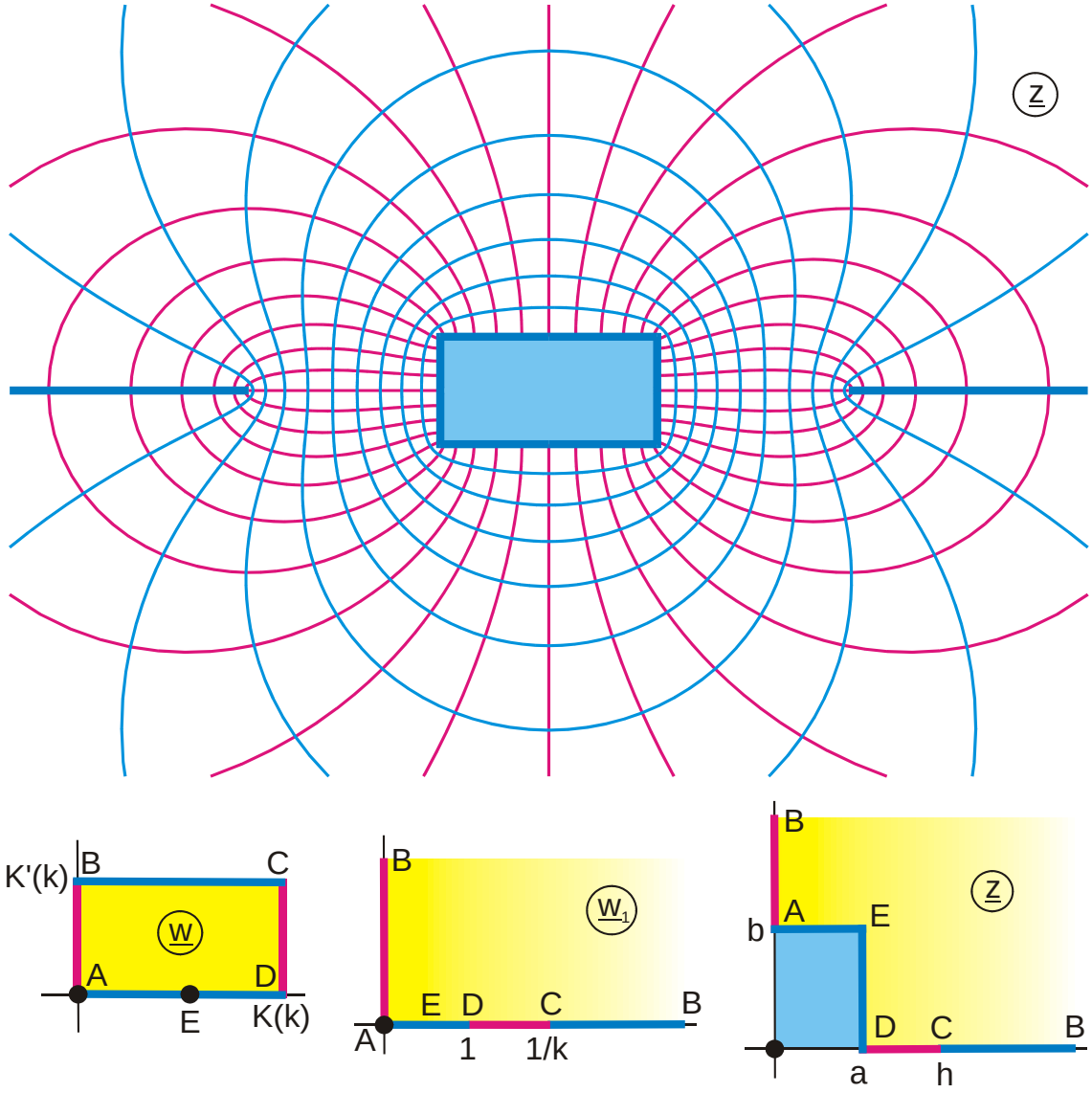


Abbildung P 4.6

$$z = B_a\left(\frac{w_1}{k_1}, k_1\right) + jb \qquad w_1 = \mathrm{sn}(w,k)$$

$$a = \frac{E(k_1) - k_1^{\,2}K(k_1)}{k_1^{\,2}} \qquad h = B_a\left(\frac{1}{kk_1}, k_1\right)$$

$$b = \frac{E'(k_1)}{k_1^{\,2}} - K'(k_1)$$

$0 \le u \le K(k)$ $\qquad$ $0 \le v \le K'(k)$

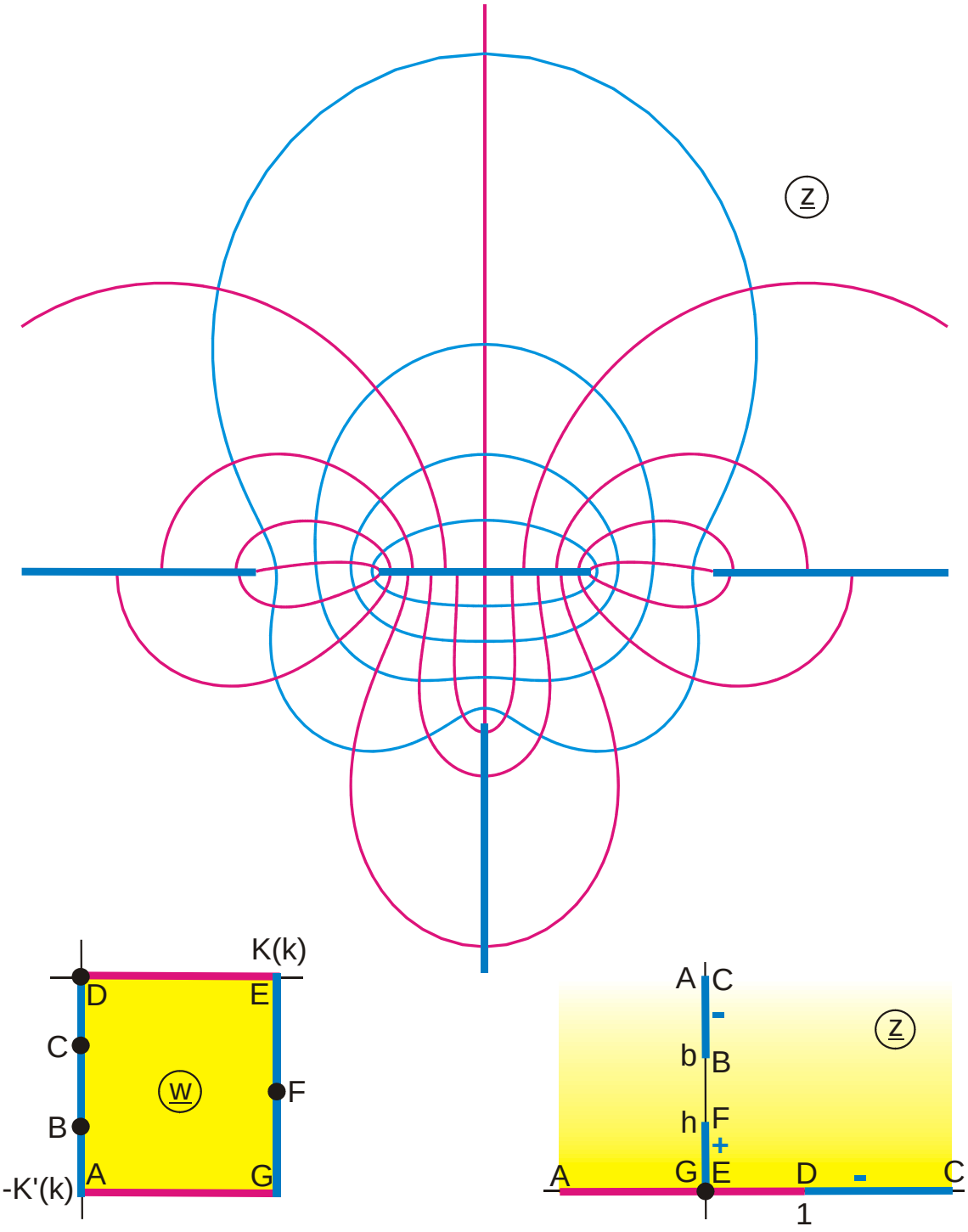


Abbildung P 4.7

$$z = \frac{\mathrm{cn}(w,k)\,\mathrm{dn}(w,k)}{\sqrt{1 + a\,\mathrm{sn}^2(w,k)}}$$

$0 \le u \le K(k)$ $\qquad$ $-K'(k) \le v \le 0$

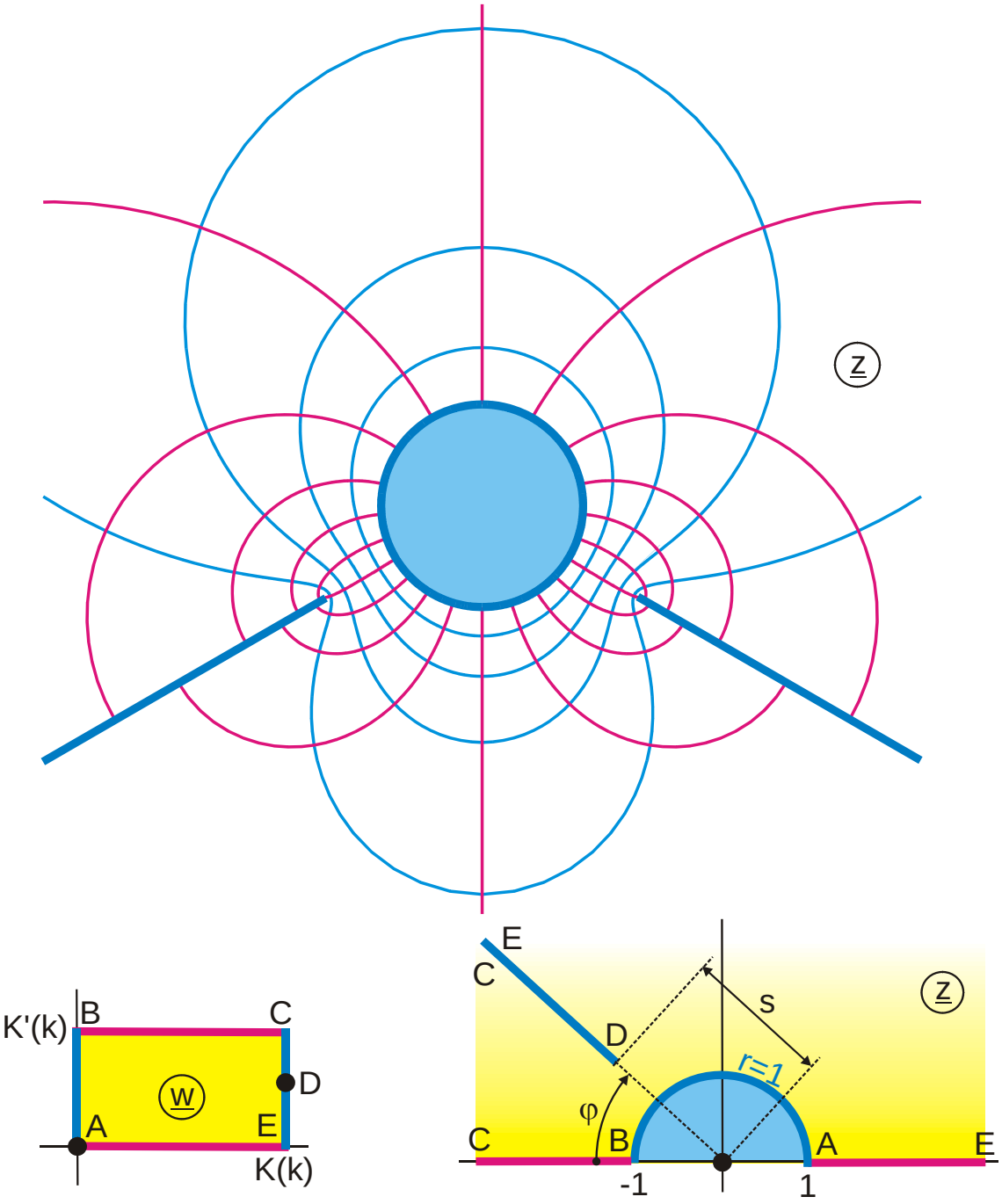


Abbildung P 4.8

$$z = \left(\frac{w_1 + 1}{w_1 - 1}\right)^{f} \left(\frac{w_1 + k}{w_1 - k}\right)^{f \cdot b} \qquad w_1 = \mathrm{sn}(w, k) \qquad p = \sqrt{\frac{1 + a^2 b}{a^2 + b}}$$

gegeben: φ, a $\qquad s = \exp\left[2f\left\{\mathrm{ar\,tanh}(a/p) + b\,\mathrm{ar\,tanh}(ap)\right\}\right]$

$f = 1 - \varphi/\pi \qquad v_D = \mathrm{Im}\,F_a(p/a, k) \qquad b = \varphi/(\pi - \varphi)$

$k = a^2 \qquad 0 \le u \le K(k) \qquad 0 \le v \le K'(k)$

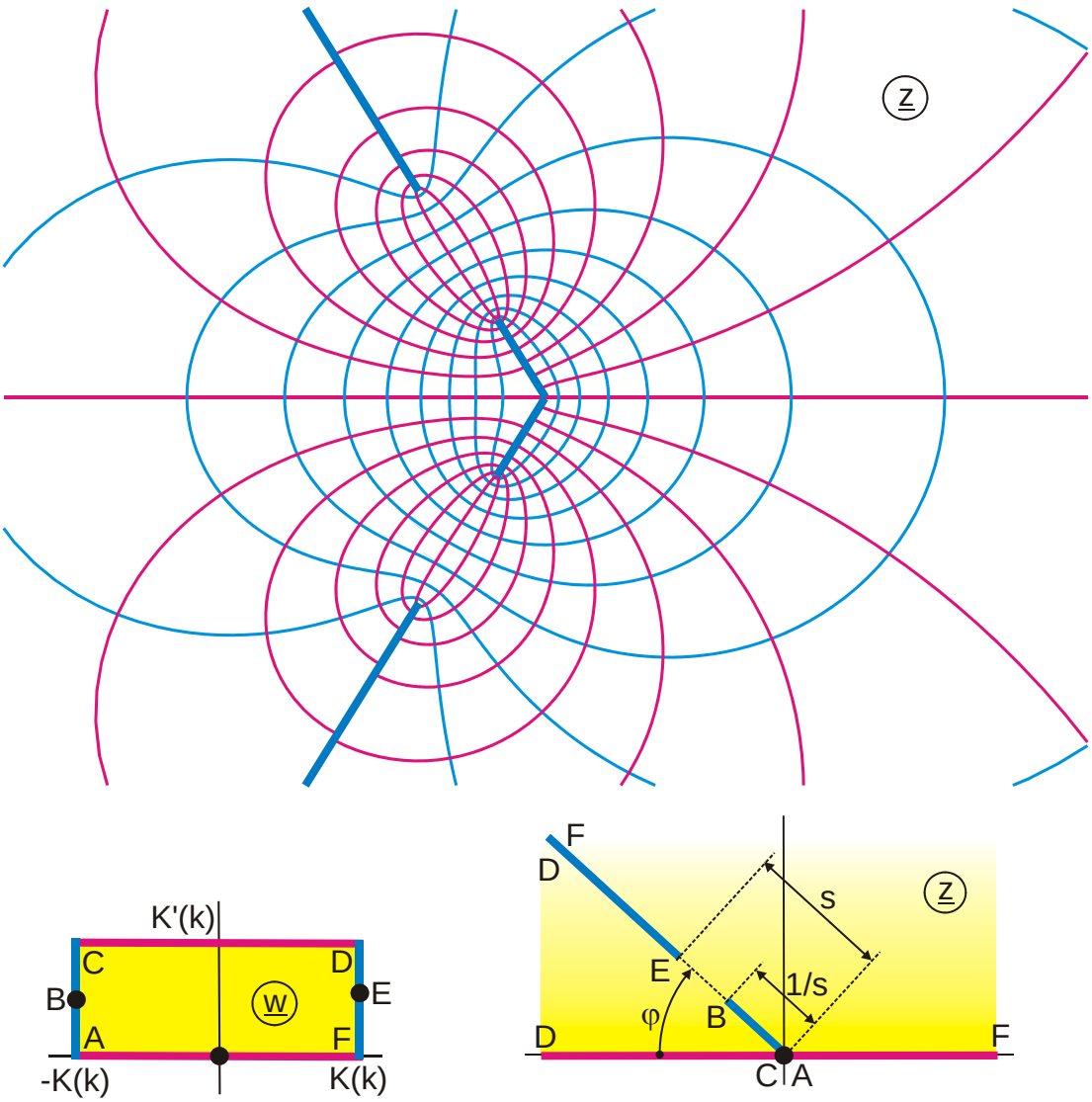


Abbildung P 4.9

$$z = \left(\frac{w_1 + 1}{w_1 - 1}\right)^{f} \left(\frac{w_1 + k}{w_1 - k}\right)^{f \cdot b} \qquad w_1 = \mathrm{sn}(w, k) \qquad p = \sqrt{\frac{1 + a^2 b}{a^2 + b}}$$

gegeben: φ, a

$$s = \exp\left[2f\left\{\mathrm{ar\,tanh}(a/p) + b\,\mathrm{ar\,tanh}(ap)\right\}\right]$$

$f = 1 - \varphi/\pi$

$$v_E = v_B = \mathrm{Im}\,F_a\left(p/a, k\right)$$

$k = a^2$

$b = \varphi/(\pi - \varphi)$

$0 \le u \le K(k)$ $\qquad$ $0 \le v \le K'(k)$

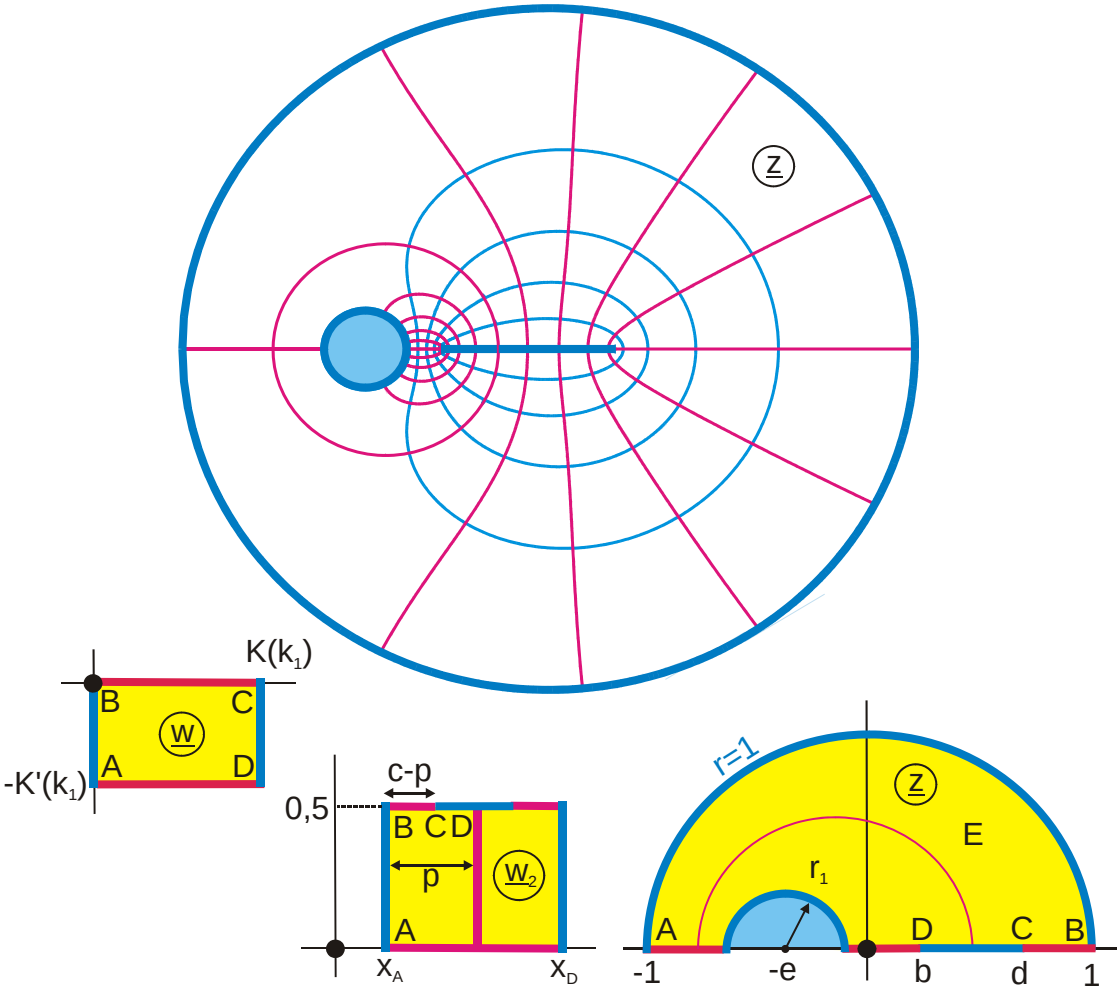


Abbildung P 4.10

$z = a\tanh(w_2\pi) - d_2$

$w_1 = k_1\,\mathrm{sn}(w, k_1)$

$a = \sqrt{f^2 - r_1^2}\,/e$

$x_A = \dfrac{1}{2\pi} ar\sinh a$

$d_2 = \sqrt{a^2+1}$

$\tau = \dfrac{1}{x_D - x_A}$

$0 \le u \le K(k_1)$

$w_2 = x_A + \dfrac{j}{2} + \dfrac{F_a(w_1,k)}{2K'(k)}$

$f = \left(1 + r_1^2 - e^2\right)/2$

gegeben: e, c, r_1

$x_D = \dfrac{1}{2\pi} ar\sinh\dfrac{a}{r_1}$

$k_1 = \mathrm{sn}\{cK(k), k\}$

$k = \left[\dfrac{\vartheta_2(0,\tau)}{\vartheta_3(0,\tau)}\right]^2$

$-K'(k_1) \le v \le 0$

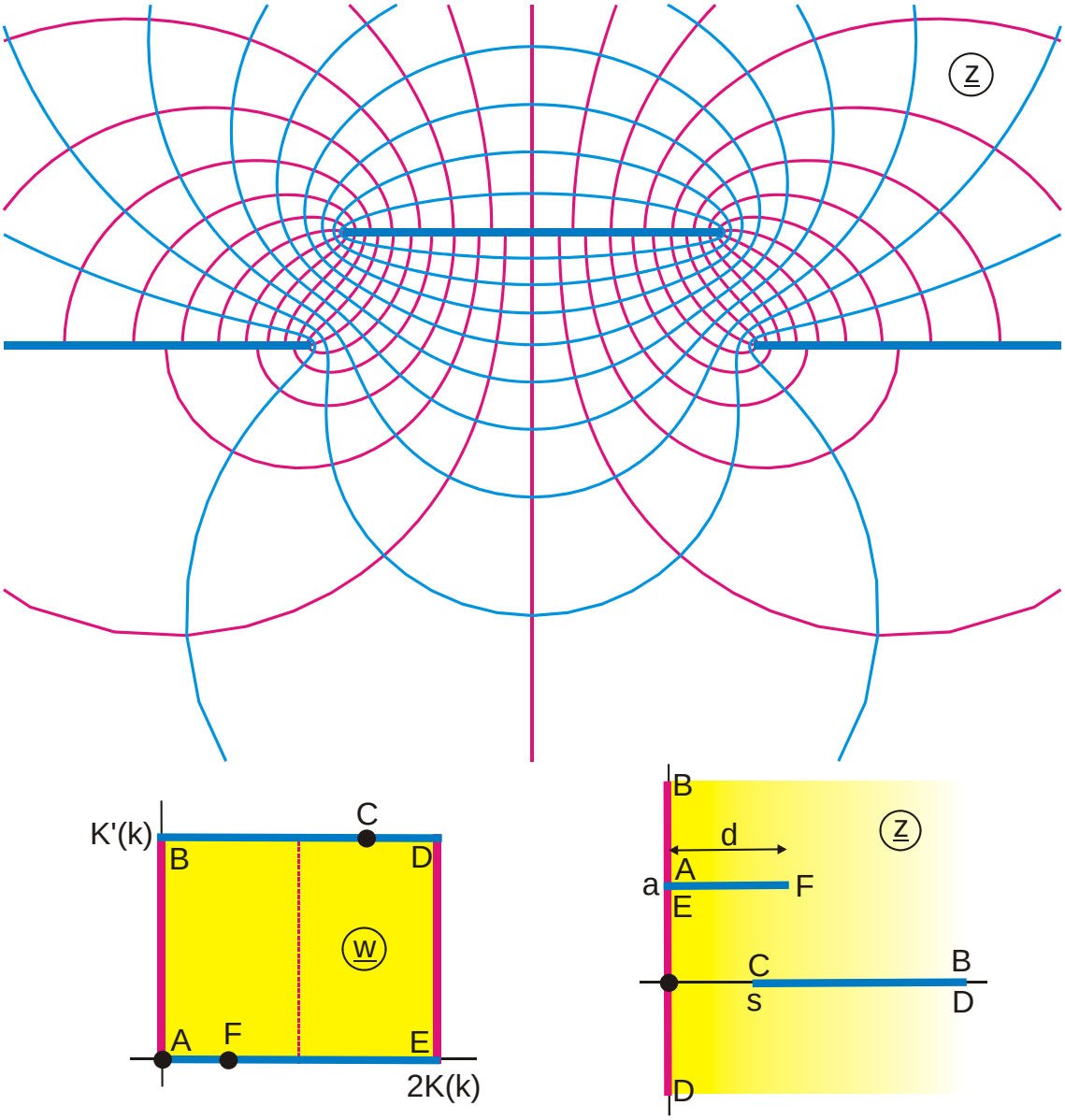


Abbildung P 4.11

$$z = Z_e(w,k) + b\,sn(w,k) + ja$$

gegeben: b, k

$$a = \frac{\pi}{2K(k)}$$

$0 \le u \le 2K(k)$ $0 \le v \le K'(k)$

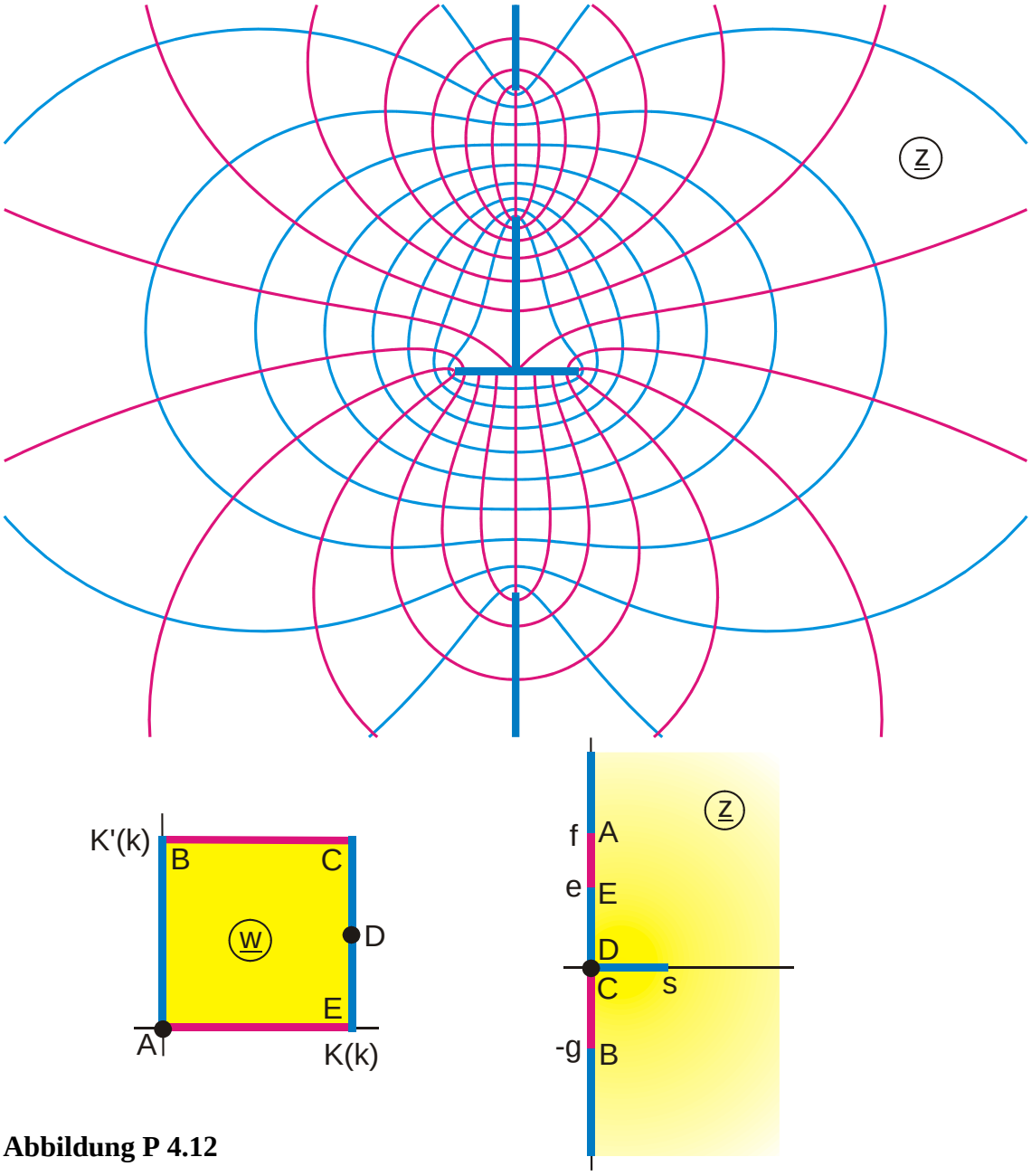


Abbildung P 4.12

$$z = \left[\mathrm{sn}(w + ja, k_1) - \mathrm{sn}(w - ja, k_1)\right]$$

$$w_2 = F_a(w_1, k_1)$$

$$w_1 = \frac{k}{k_1}\,\mathrm{sn}(w, k)$$

$$\tau = \frac{K'(k_1)}{K(k_1)}$$

$$\mathrm{k_1} = \left[\frac{\vartheta_2(0,\tau)}{\vartheta_3(0,\tau)}\right]^2$$

$$\mathrm{k} = \mathrm{k_1}\,\mathrm{sn}(\mathrm{d}, \mathrm{k_1})$$

$$v_D = \mathrm{Im}\,F_a\left(\frac{k_1}{k}, k\right)$$

$$d = F_a\left(\frac{k}{k_1}, k_1\right)$$

gegeben: a, τ, d

$0 \le \mathrm{v} \le \mathrm{K'(k)}$

$0 \le \mathrm{u} \le \mathrm{K(k)}$

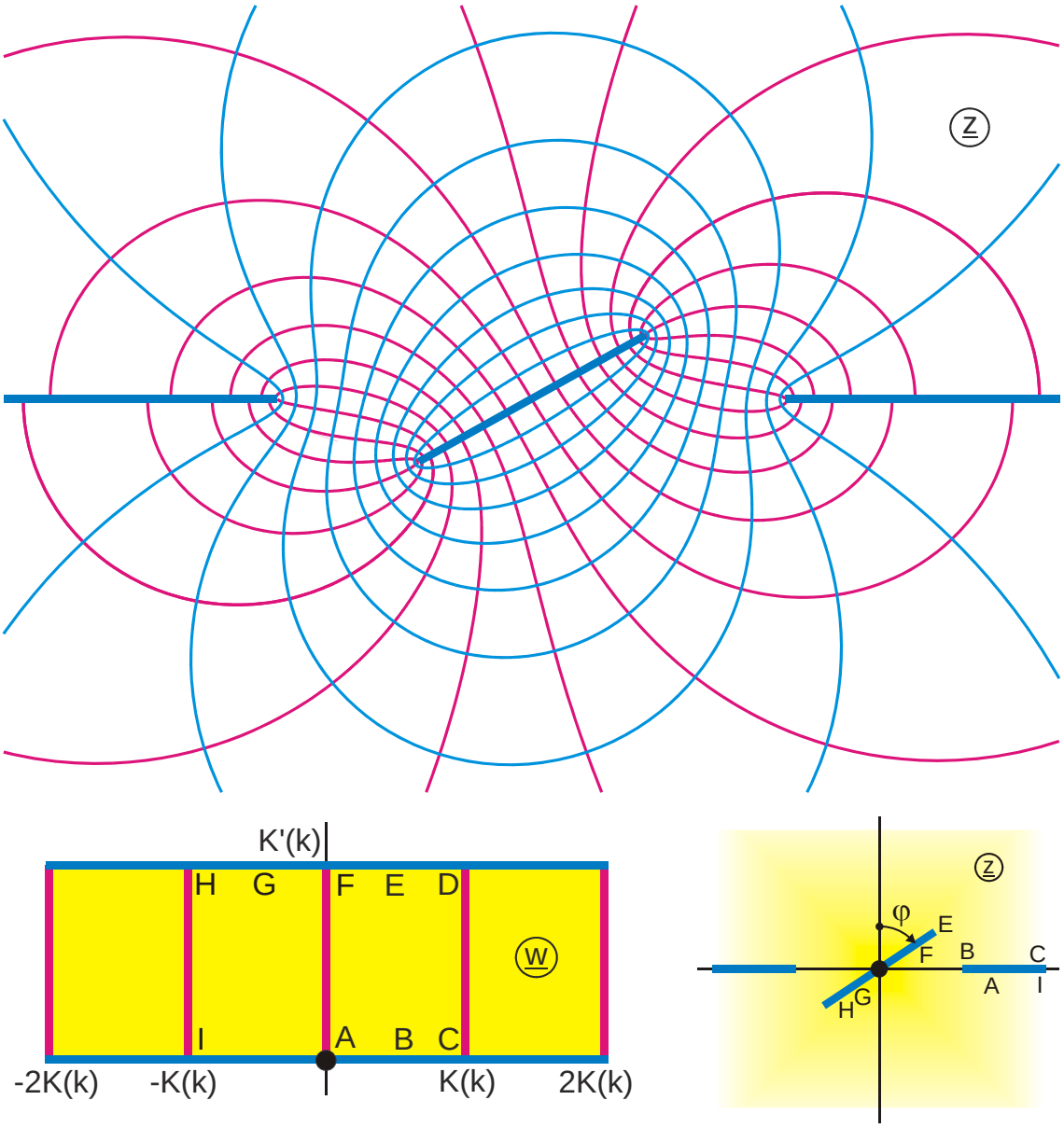


Abbildung P 4.13

$$z = \vartheta_4\left[\frac{\pi}{2K(k)}(w+a),\tau\right] \Big/ \vartheta_2\left[\frac{\pi}{2K(k)}(w-a),\tau\right]$$

$$a = \frac{\varphi\, K(k)}{\pi} \qquad \tau = \frac{K'(k)}{K(k)}$$

gegeben: φ, k

$-2K(k) \le u \le 2K(k)$ $\qquad$ $0 \le v \le K'(k)$

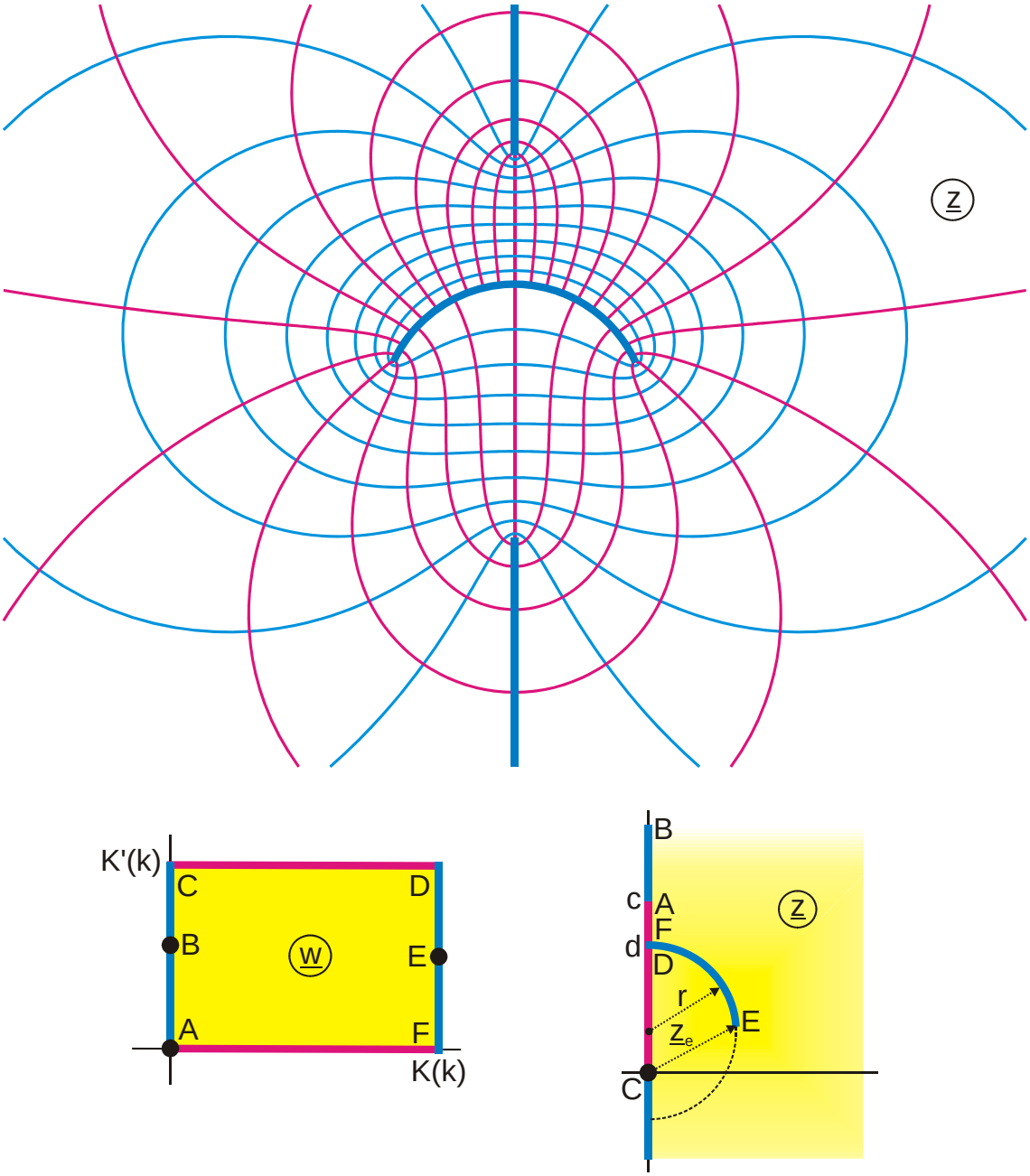


Abbildung P 4.14

$$z = 1/w_3 \qquad w_3 = \sqrt{w_2^{\,2}+1} - js \qquad w_2 = -j\frac{w_1 - a}{b}$$

$$w_1 = \mathrm{sn}^2(w,k) \qquad b = \frac{1}{h^2}\left(1+\sqrt{1+h^2}\right)$$

$$k = \frac{1}{\sqrt{2b+1}} \qquad d = \frac{1}{s} \qquad a = \frac{1}{2}\left(\frac{1}{k^2}+1\right)$$

$$r = \frac{1}{2s} \qquad c = \frac{1}{s-h} \qquad \underline{z}_e = \frac{1}{s-jh}$$

$$0 \le u \le K(k) \qquad 0 \le v \le K'(k)$$

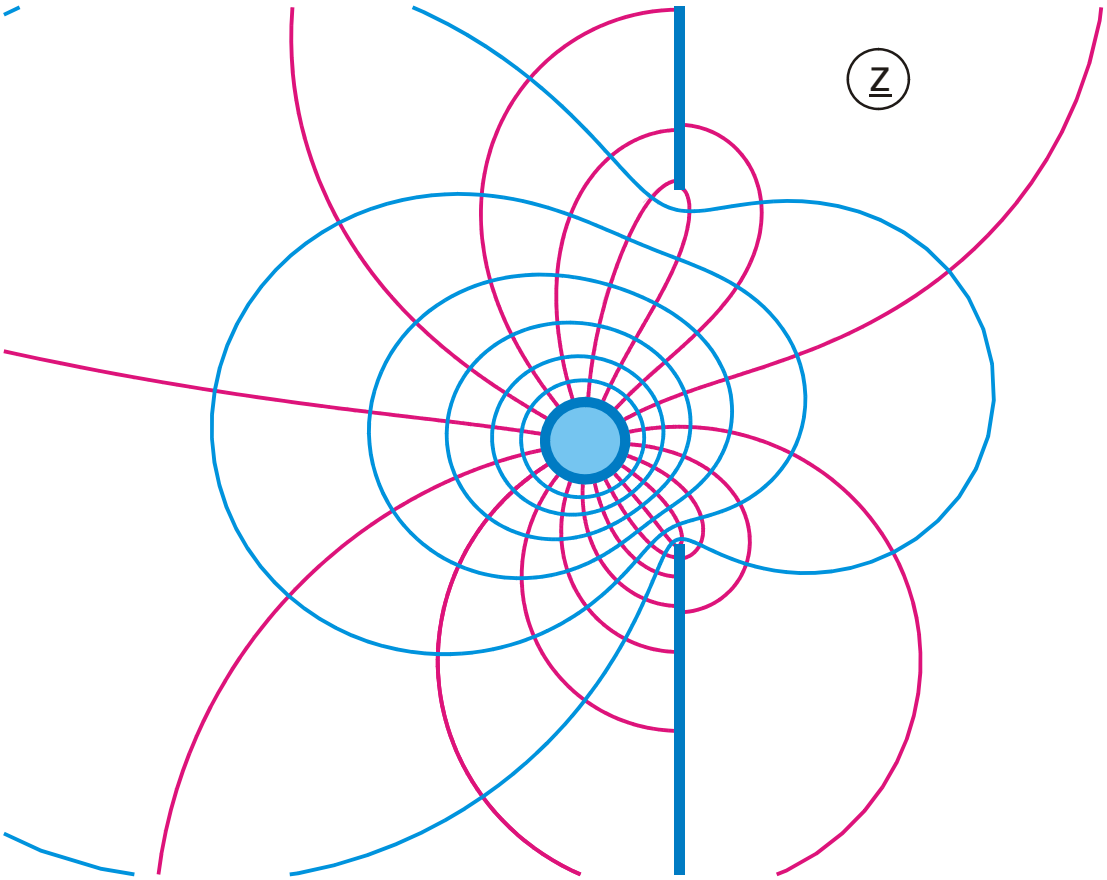


Abbildung P 4.15

$$z = \frac{1}{\rho w_1} + r \qquad w_1 = r\left\{1 + \exp(j\beta)\frac{\vartheta_4\left[\pi(w + ja)/2K(k), \tau\right]}{\vartheta_4\left[\pi(w - ja)/2K(k), \tau\right]}\right\}$$

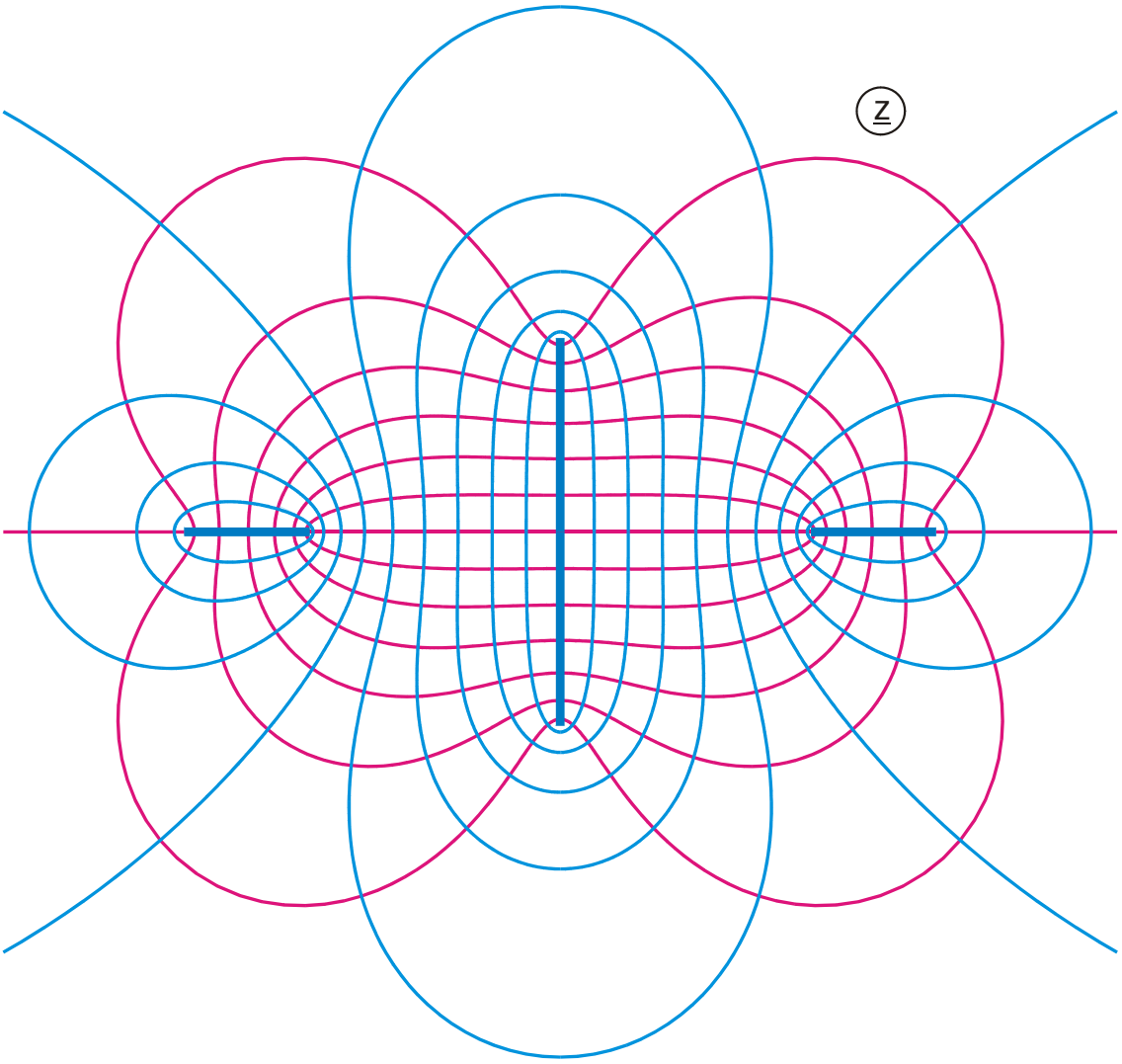
$$r = s - \sqrt{s^2 - 1} \qquad \sigma = \frac{Z(ja,k)}{k^2\,sn(ja)\left[cn(ja)\,dn(ja) + sn(ja)Z(ja,k)\right]}$$

$$a = -\ln r\,\frac{K(k)}{\pi} \qquad \rho = \frac{1}{1 - r^2} \qquad u_E = -F_a\left(\sqrt{\sigma}, k\right)$$

$$\varphi = 2\arg\vartheta_4\left[\frac{\pi}{2K(k)}\left(-u_E + ja\right), \tau\right] \qquad 0 < a < K'(k) \qquad \tau = \frac{K'(k)}{K(k)}$$

$$b_1 = \frac{1}{\rho}\,\mathrm{Im}\left\{\frac{1}{r + r\exp(-j[\varphi - \beta])}\right\} \qquad b_2 = \frac{1}{\rho}\,\mathrm{Im}\left\{\frac{1}{r + r\exp(-j[\varphi + \beta])}\right\}$$

gegeben: s, β, k $-K(k) \le u \le 0$ $0 \le v \le K'(k)$



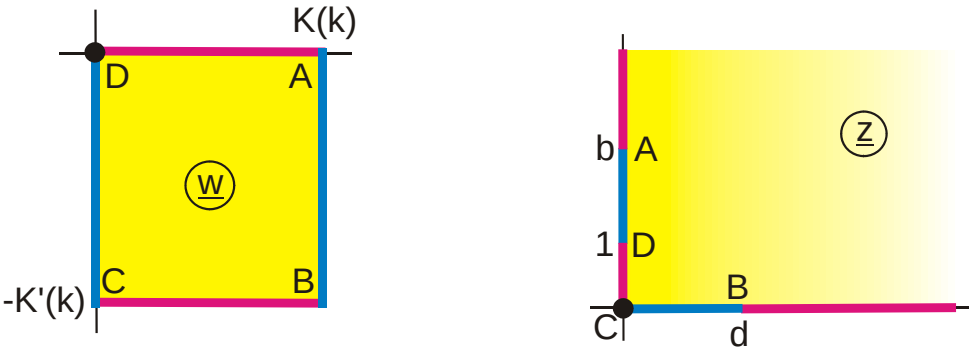


Abbildung P 5

$$z = \frac{1}{\sqrt{a\,sn^2(w,k)-1}}$$

$$a = 1 - \frac{1}{b^2}$$

gegeben: b, d

$$k = d\sqrt{\frac{a}{1+d^2}}$$

$0 \le u \le K(k)$

$-K'(k) \le v \le 0$

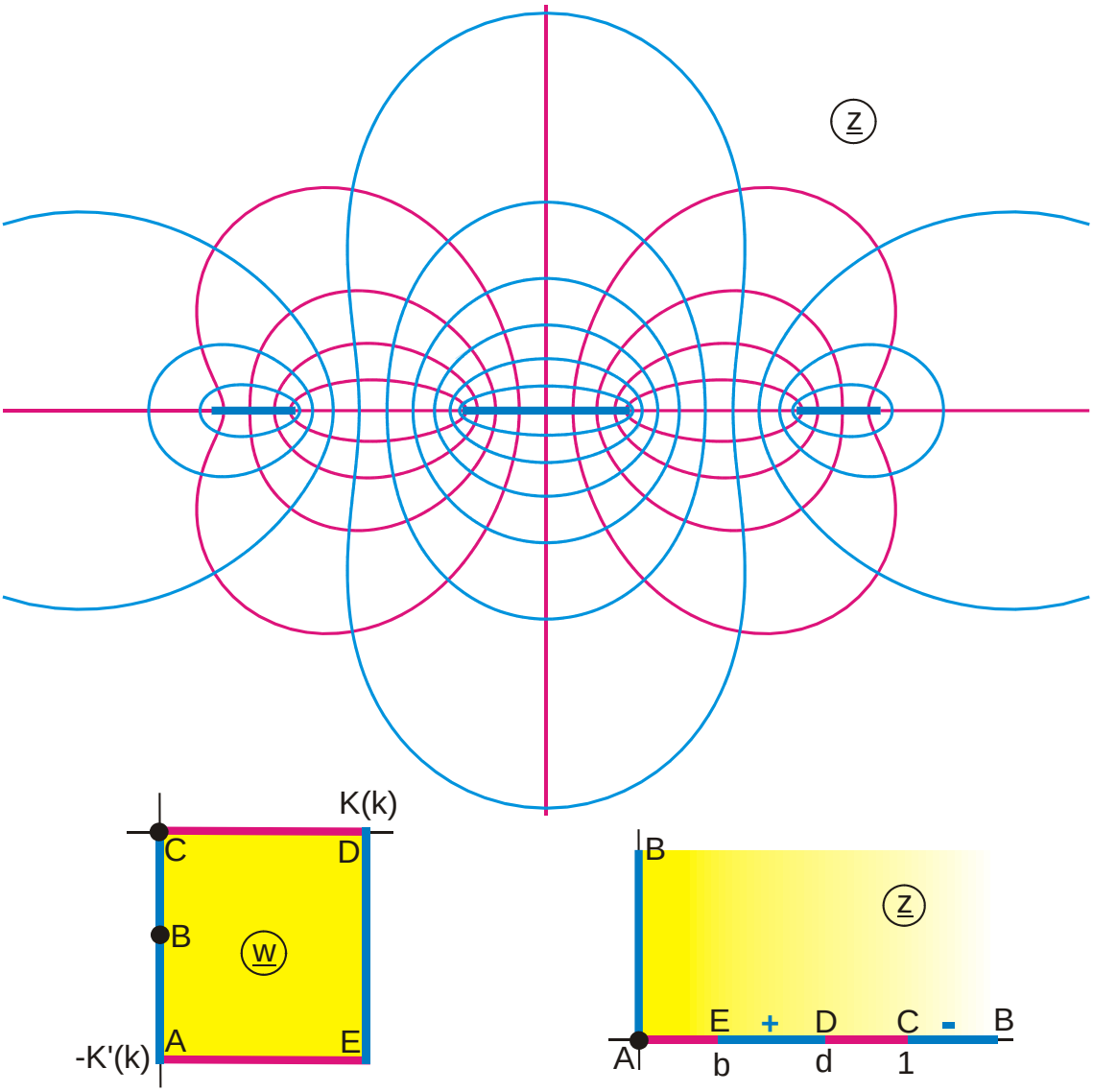


Abbildung P 5.1

$$z = \frac{1}{\sqrt{1 + a\,sn^2(w,k)}}$$

$$a = \frac{1}{d^2} - 1$$

gegeben: b, d

$$k = b\sqrt{\frac{a}{1-b^2}}$$

$0 \le u \le K(k)$

$-K'(k) \le v \le 0$

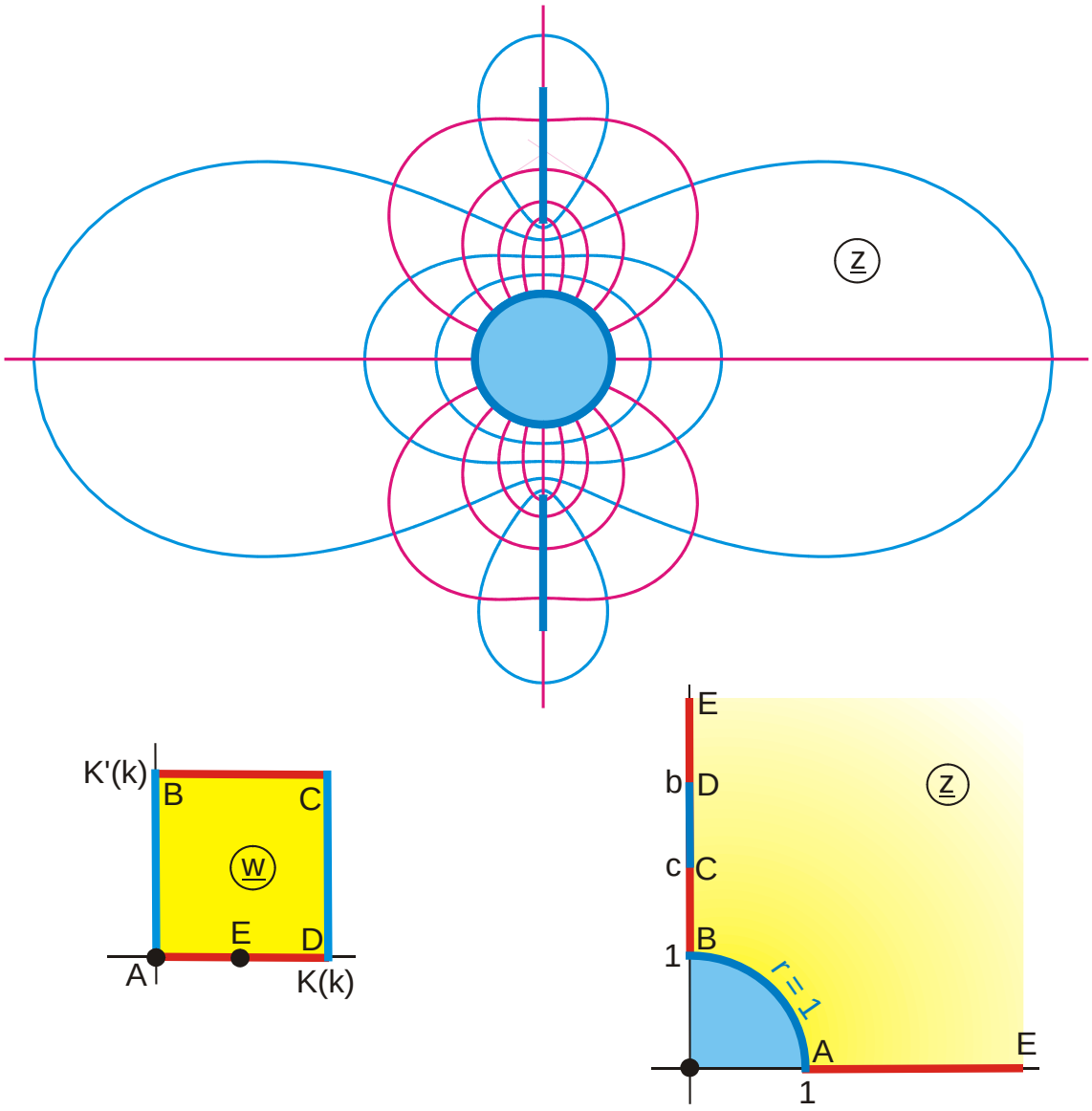


Abbildung P 5.2

$$z = \sqrt{\frac{1 + a\,\mathrm{sn}(w,k)}{1 - a\,\mathrm{sn}(w,k)}}$$

$$a = \frac{b^2 - 1}{b^2 + 1} \qquad k = a\frac{c^2 - 1}{c^2 + 1}$$

$$u_E = \mathrm{Re}\,F_a\left(1/a, k\right)$$

$0 \le u \le K(k)$ $\qquad$ $0 \le v \le K'(k)$

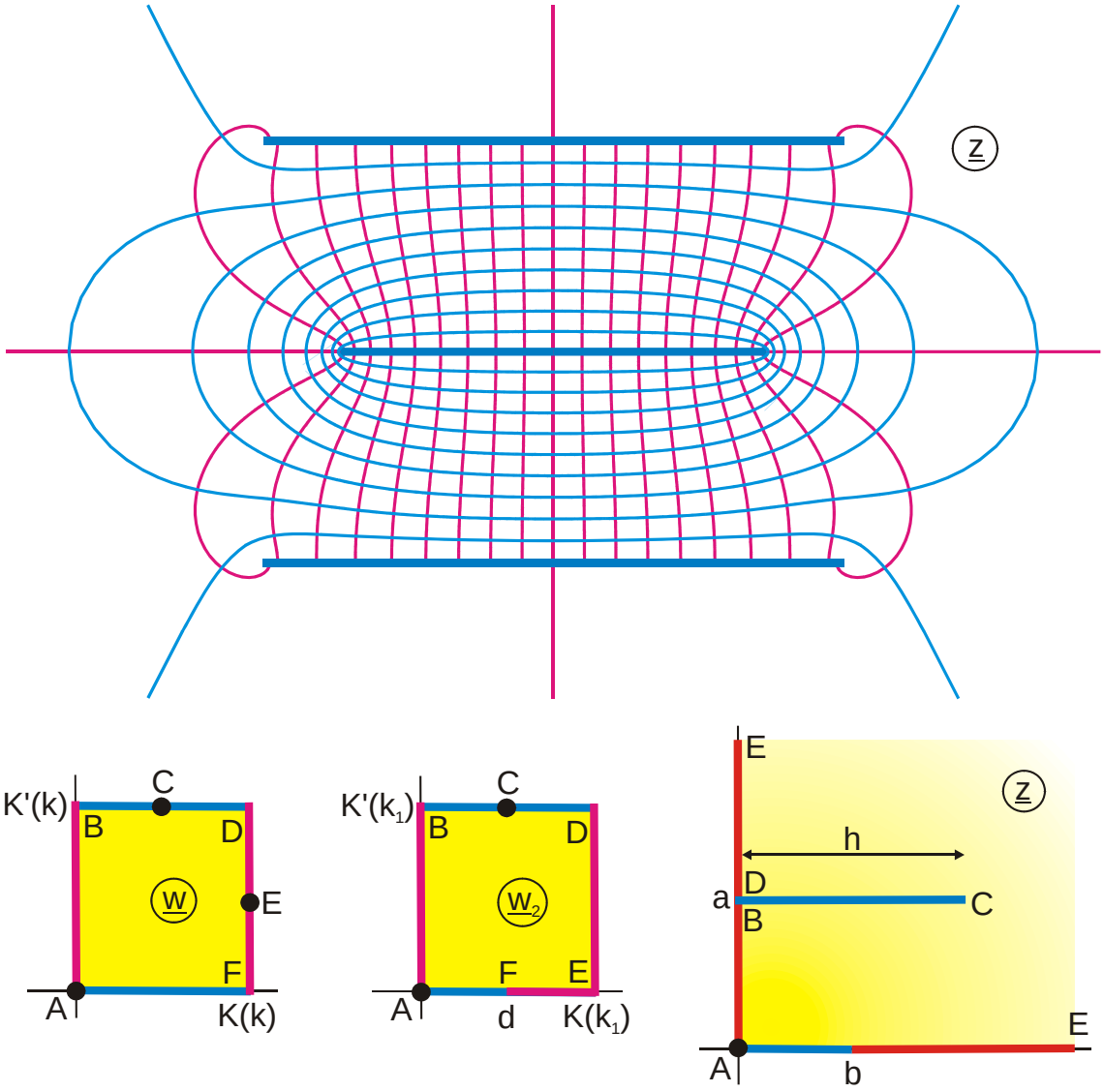


Abbildung P 5.3

$z = ja - Z_e(w_3, k_1)$

$w_3 = w_2 - K(k_1) - jK'(k_1)$

$w_2 = F_a(w_1, k_1)$

$w_1 = \frac{k}{k_1}\,\mathrm{sn}(w, k)$

$a = \pi/\{2K(k_1)\}$

$h = Z_e(\lambda, k_1)$

$v_E = \mathrm{Im}\, F_a\left(\frac{k_1}{k}, k\right)$

$\lambda = F_a\left(\frac{1}{k_1}\sqrt{1 - \frac{E(k_1)}{K(k_1)}}, k_1\right)$

$b = Z_e\{K(k_1) - d + jK'(k_1), k_1\}$

$d = F_a\left(\frac{k}{k_1}, k_1\right)$

$0 \le u \le K(k)$

$0 \le v \le K'(k)$

gegeben: k, k_1, mit $k < k_1$

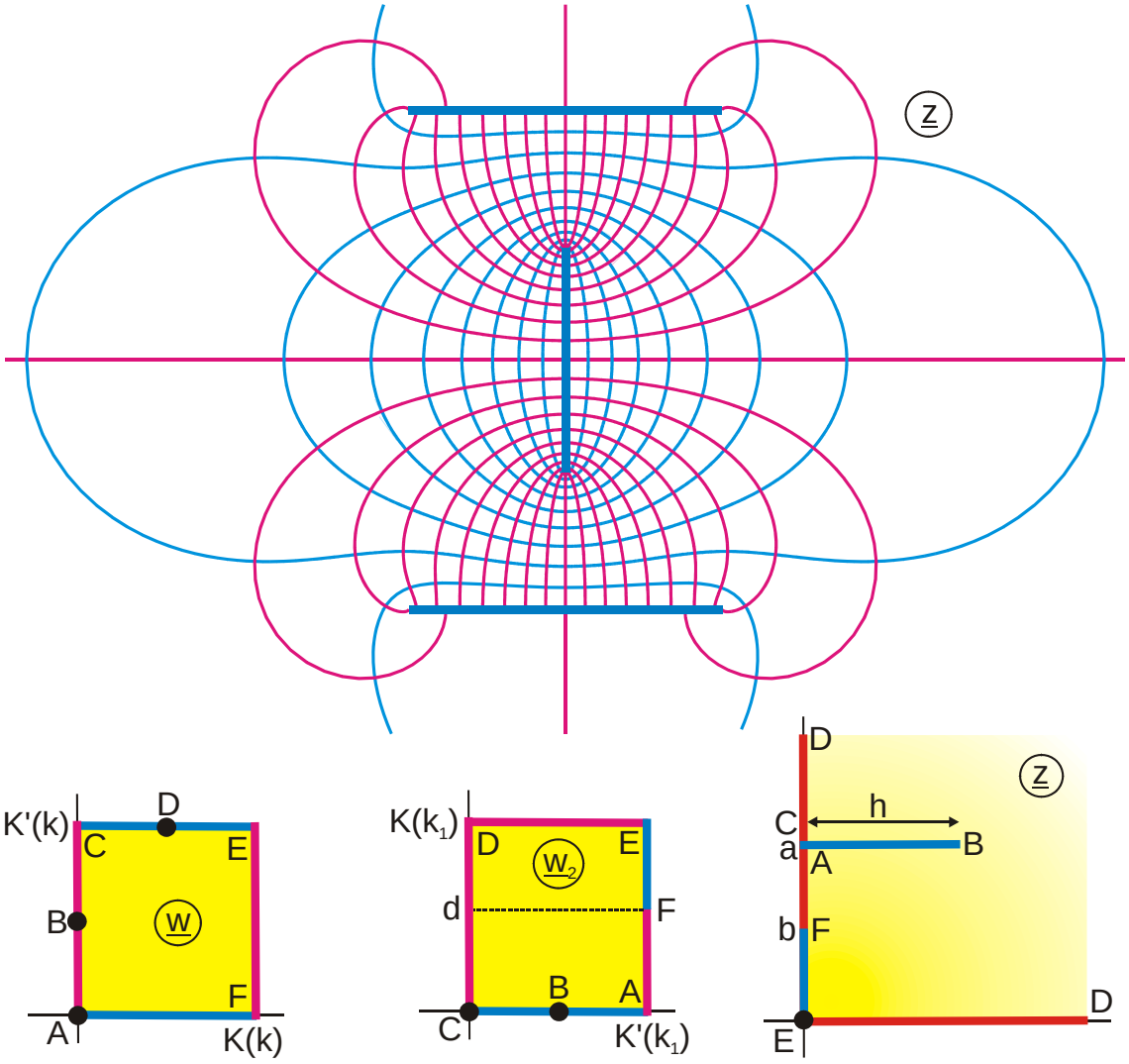


Abbildung P 5.4

$z = Z_e(w_3, k_1') + ja$

$w_3 = K'(k_1) + jw_2$

$w_2 = F_a(w_1, k_1)$

$w_1 = k\ \mathrm{sn}(w, k)$

$a = \pi/\{2K'(k_1)\}$

$h = Z_e(\lambda, k_1')$

gegeben: k, k_1

$\lambda = F_a\left(\frac{1}{k_1'}\sqrt{1-\frac{E'(k_1)}{K'(k_1)}}, k_1'\right)$

$c = \mathrm{Im}\, Z_e\{K'(k_1) + jd, k_1'\}$ $\quad b = a - c$ $\quad d = F_a(k, k_1)$

$0 \le u \le K(k)$ $\quad 0 \le v \le K'(k)$

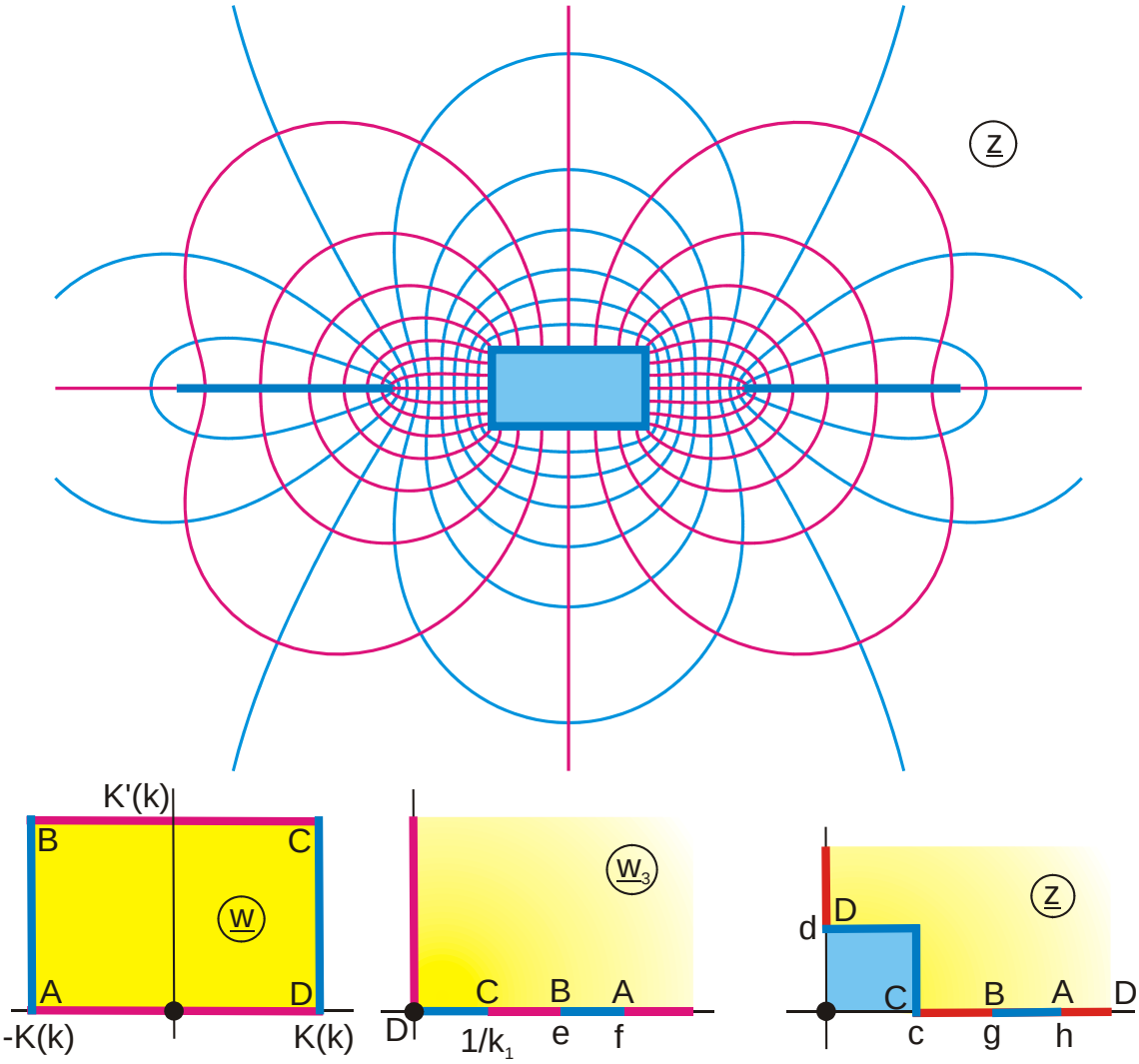


Abbildung P 5.5

$z = B_a\left(w_3, k_1\right) + jd$

$w_3 = \frac{w_2}{ak_1}$

$w_2 = \sqrt{1 - w_1}$

$c = \frac{E(k_1) - k_1{}'^2\, K(k_1)}{k_1{}^2}$

$w_1 = \frac{k + \sigma\, sn(w,k)}{\sigma + k\, sn(w,k)}$

$g = B_a\left(\frac{b}{ak_1}, k_1\right)$

$h = B_a\left(\frac{\sqrt{2}}{ak_1}, k_1\right)$

$k = \frac{1 - a_1 a_2}{a_1 - a_2} - \sqrt{\left(\frac{1 - a_1 a_2}{a_1 - a_2}\right)^2 - 1}$

$d = \frac{E'(k_1)}{k_1{}^2} - K'(k_1)$

$\sigma = k\frac{k - a_1}{1 - k a_1}$

$a_1 = b^2 - 1$

$a_2 = a^2 - 1$

$e = b / (ak_1)$

gegeben: a, b, k_1

$f = \sqrt{2}/(ak_1)$

$-K(k) \le u \le K(k)$

$0 \le v \le K'(k)$

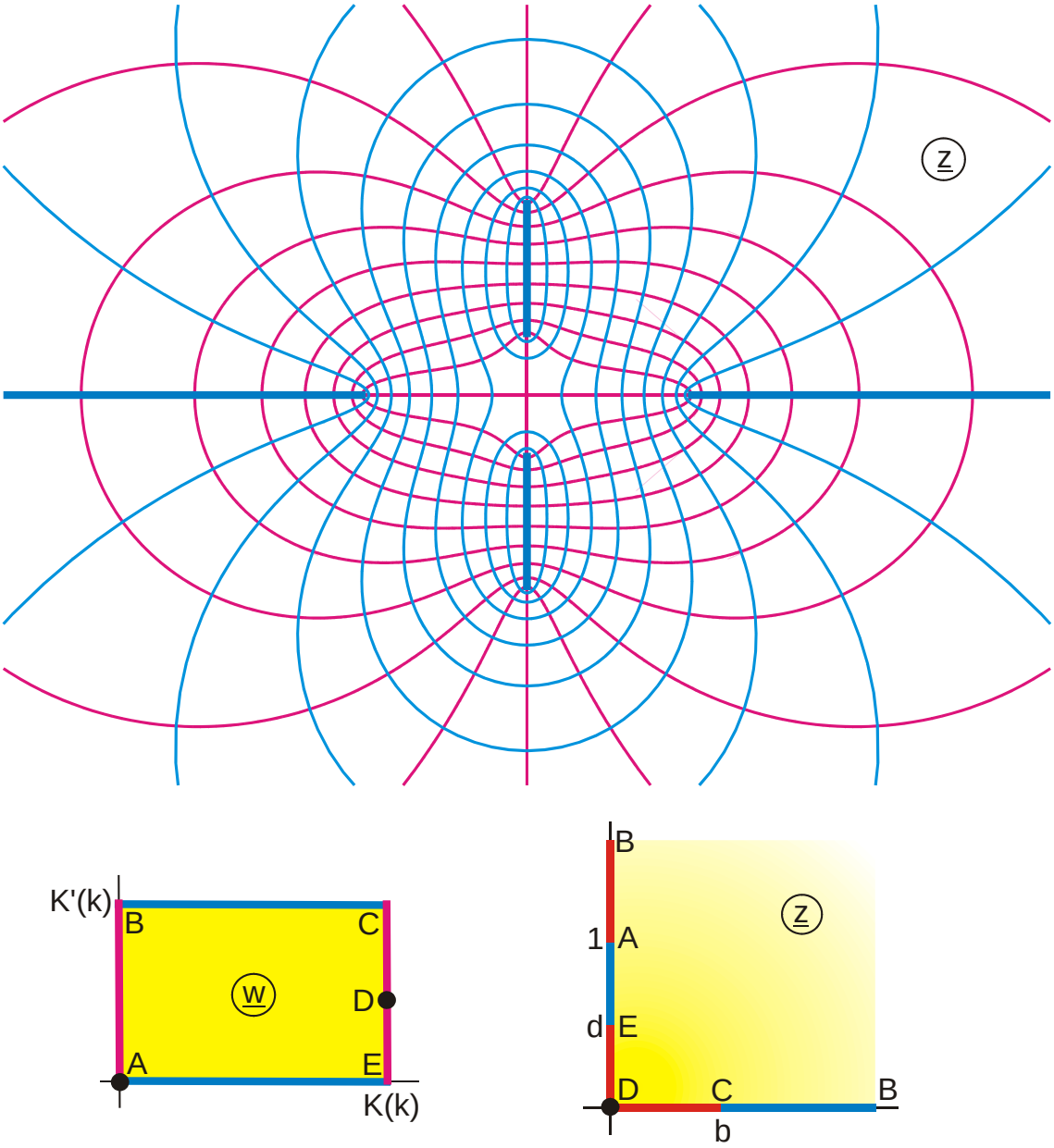


Abbildung P 5.6

$$z = \sqrt{a\,\mathrm{sn}^2(w,k) - 1}$$

$$a = \sqrt{1 - d^2} \qquad k = \sqrt{\frac{a}{1 + b^2}}$$

gegeben: b, d

$0 \le u \le K(k)$ $\qquad$ $0 \le v \le K'(k)$

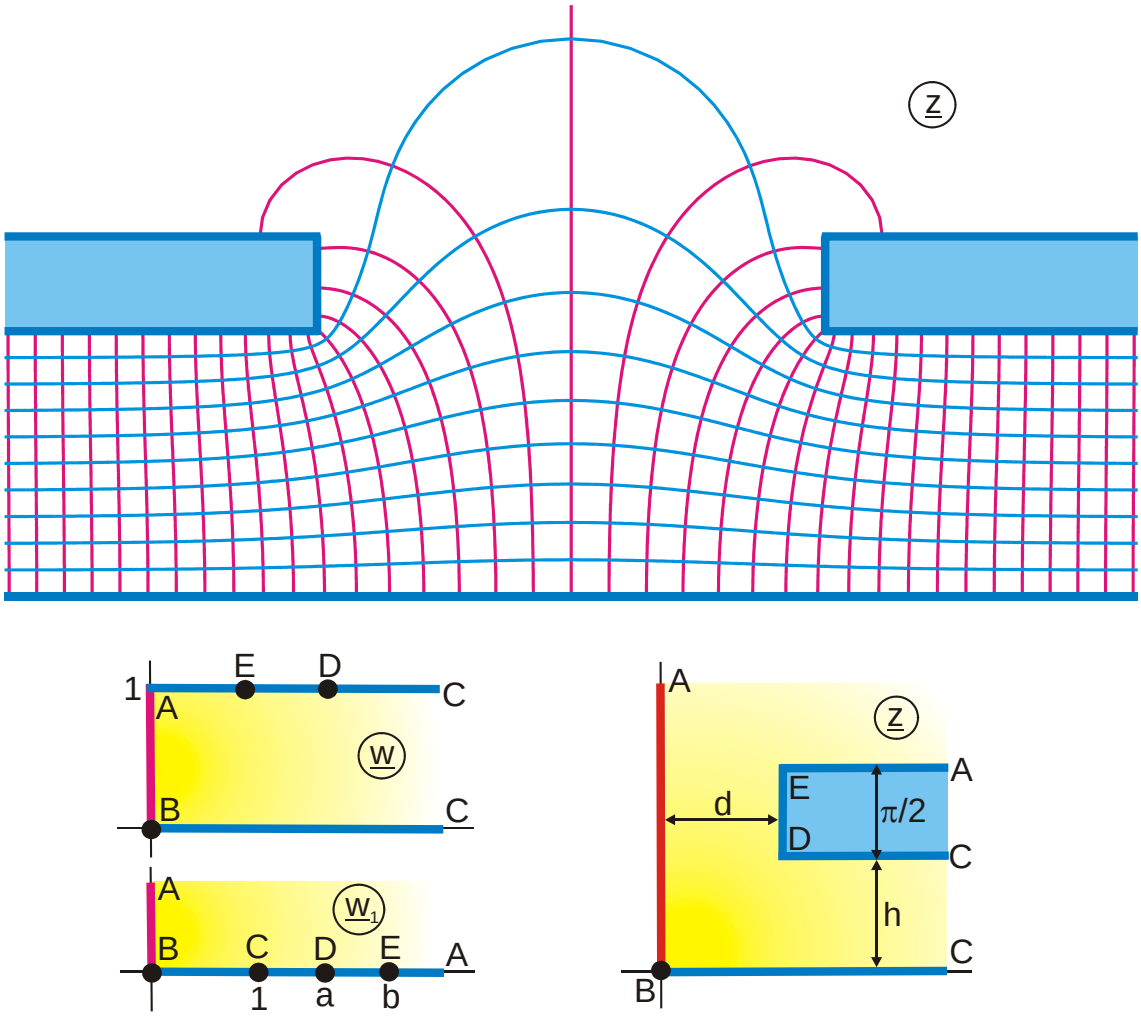


Abbildung P 6

$$z = \left(\sigma - \frac{1}{\lambda}\right) F_a\left(\frac{w_1}{a}, k\right) + \lambda E_a\left(\frac{w_1}{a}, k\right) + \frac{1}{\lambda}\Pi_a\left(\frac{w_1}{a}, a^2, k\right)$$

$w_1 = \tanh\left(w\pi/2\right)$ $\qquad k = a/b$ $\qquad a^2 > k^2$

$$\sigma = a\sqrt{\frac{a^2-1}{a^2-k^2}} \qquad \lambda = \frac{a}{\sqrt{\left(a^2-1\right)\left(a^2-k^2\right)}}$$

$$d = K(k)\left\{\frac{\sigma}{b^2} - Z_a\left(\frac{1}{a}, k\right)\right\} \qquad u_E = \frac{2}{\pi}\operatorname{ar}\tanh\frac{1}{b}$$

$$h = K'(k)\left\{a^2\lambda - \frac{1}{\lambda} - Z_a\left(\frac{1}{a}, k\right)\right\} - \lambda E'(k) - \frac{\pi}{2K(k)} F_a\left(\frac{1}{a}, k\right)$$

$$Z_a\left(\frac{1}{a}, k\right) = Z_e\left\{F_a\left(\frac{1}{a}, k\right), k\right\} \qquad u_D = \frac{2}{\pi}\operatorname{ar}\tanh\frac{1}{a}$$

$$\sigma\lambda = 1/\mathrm{dn}^2\left\{F_a(1/a, k)\right\}$$

$0 \le u \le 2$ $\qquad 0 \le v \le 1$

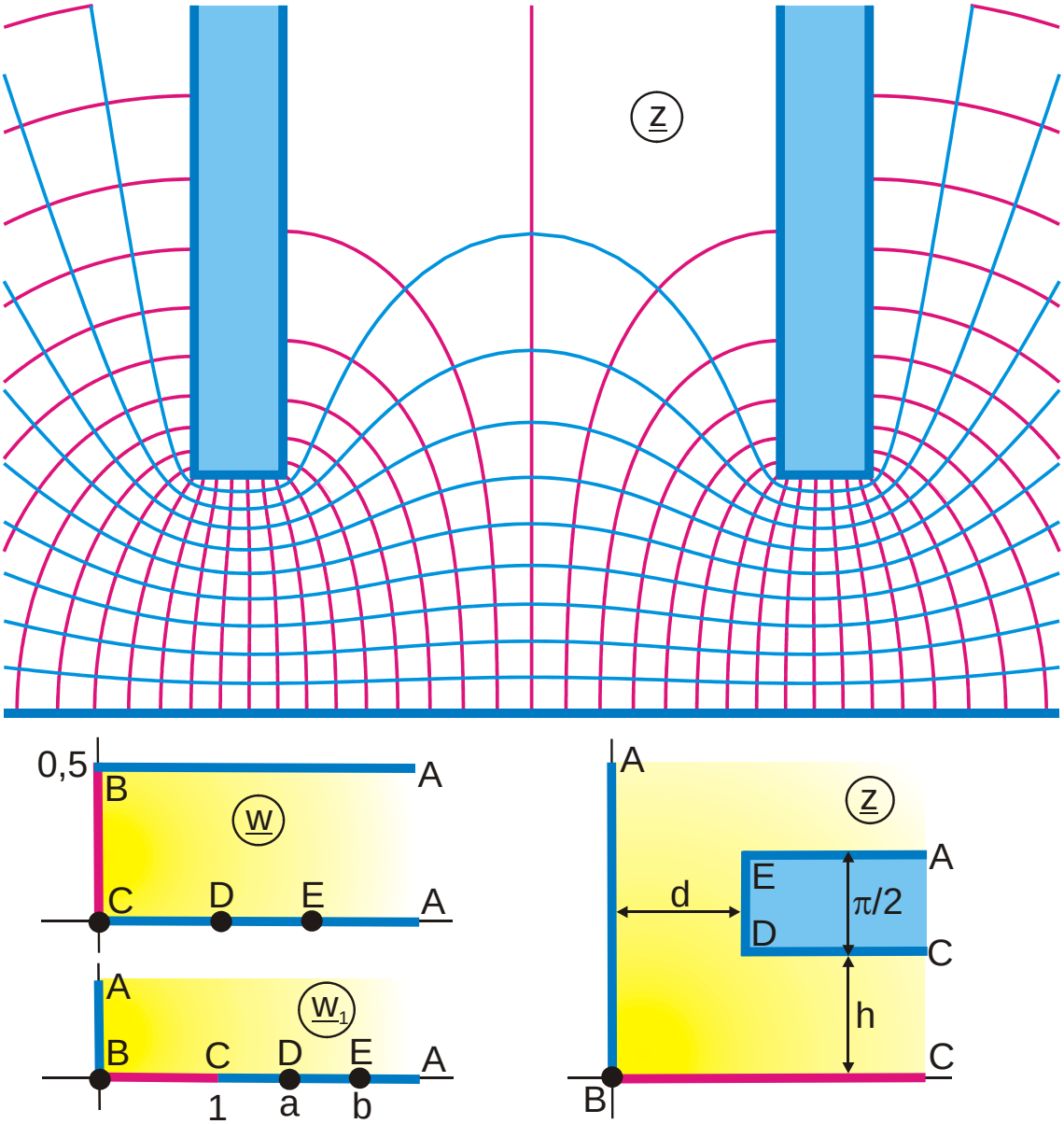


Abbildung P 6.1

$$z = \left(\sigma - \frac{1}{\lambda}\right) F_a\left(\frac{w_1}{a}, k\right) + \lambda E_a\left(\frac{w_1}{a}, k\right) + \frac{1}{\lambda}\Pi_a\left(\frac{w_1}{a}, a^2, k\right)$$

$w_1 = \cosh(w\pi)$ $\qquad k = a/b$ $\qquad a^2 > k^2$

$$\sigma = a\sqrt{\frac{a^2-1}{a^2-k^2}} \qquad \lambda = \frac{a}{\sqrt{\left(a^2-1\right)\left(a^2-k^2\right)}}$$

$$d = K(k)\left\{\frac{\sigma}{b^2} - Z_a\left(\frac{1}{a}, k\right)\right\} \qquad u_E = \frac{1}{\pi}\operatorname{ar\,tanh} b$$

$$h = K'(k)\left\{a^2\lambda - \frac{1}{\lambda} - Z_a\left(\frac{1}{a}, k\right)\right\} - \lambda E'(k) - \frac{\pi}{2K(k)} F_a\left(\frac{1}{a}, k\right)$$

$$Z_a\left(\frac{1}{a}, k\right) = Z_e\left\{F_a\left(\frac{1}{a}, k\right), k\right\} \qquad u_D = \frac{1}{\pi}\operatorname{ar\,tanh} a$$

$0 \le u \le 1$ $\qquad 0 \le v \le 1/2$

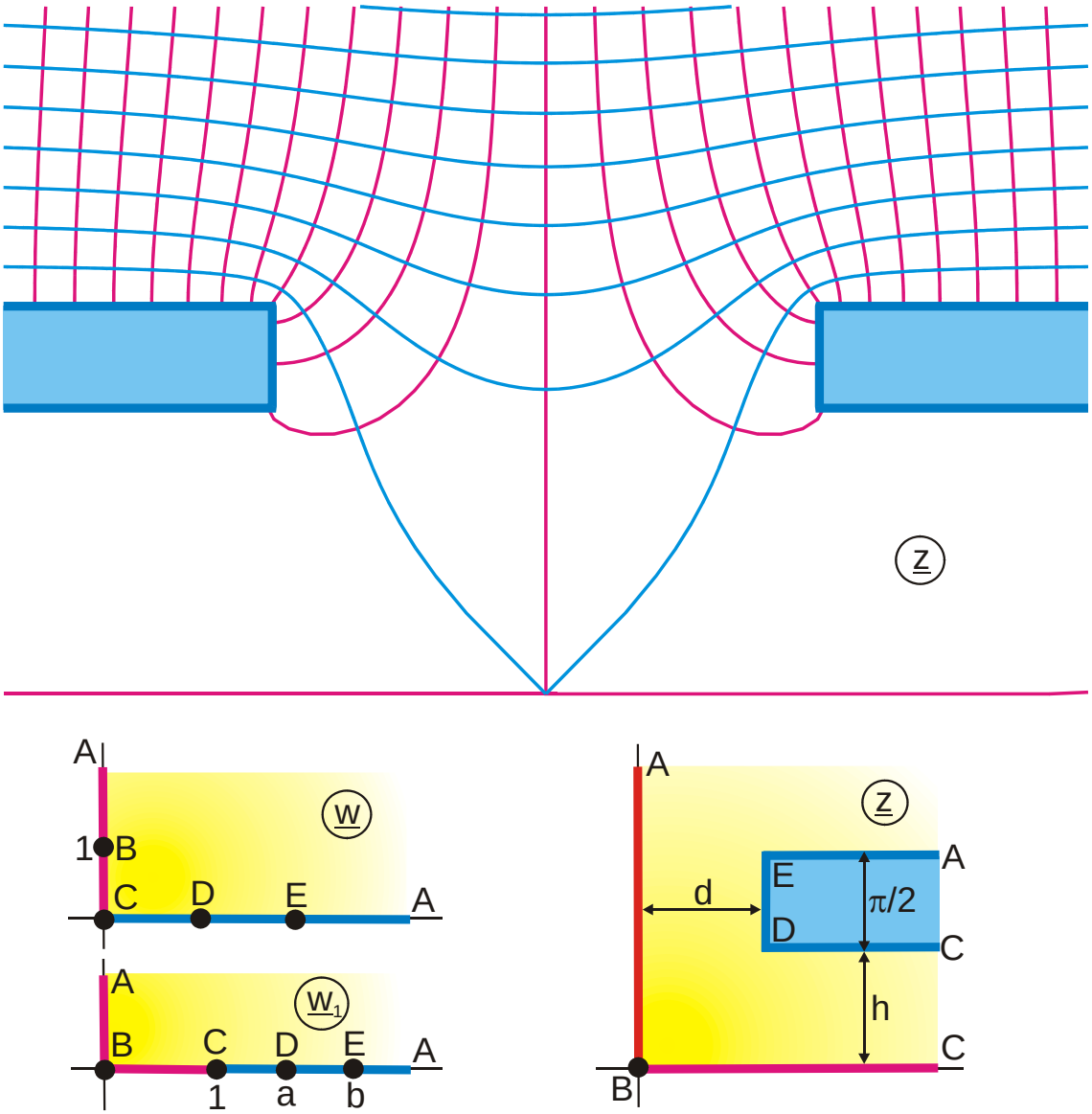


Abbildung P 6.2

$$z = \sigma F_a\left(\frac{w_1}{a},k\right) + \lambda E_a\left(\frac{w_1}{a},k\right) - \Pi_a\left\{F_a\left(\frac{w_1}{a},k\right),k,\alpha + jK'(k)\right\}$$

$w_1 = \sqrt{w^2+1}$ $\qquad$ $k = a/b$ $\qquad$ gegeben: a, b

$$\sigma = a\sqrt{\frac{a^2-1}{a^2-k^2}} \qquad \lambda = \frac{a}{\sqrt{\left(a^2-1\right)\left(a^2-k^2\right)}}$$

$$d = K(k)\left\{\sigma/b^2 - Z_e(\alpha,k)\right\} \qquad u_E = \sqrt{b^2-1}$$

$$h = K'(k)\left\{a^2\lambda - \frac{1}{\lambda} - Z_e(\alpha,k)\right\} - \lambda E'(k) - \frac{\pi\alpha}{2K(k)} \qquad \alpha = F_a\left(\frac{1}{a},k\right)$$

$$Z_a(1/a,k) = Z_e\{\alpha,k\} \qquad u_D = \sqrt{a^2-1}$$

$0 \le u \le 12$ $\qquad$ $v_E = 1$ $\qquad$ $0 \le v \le 8$

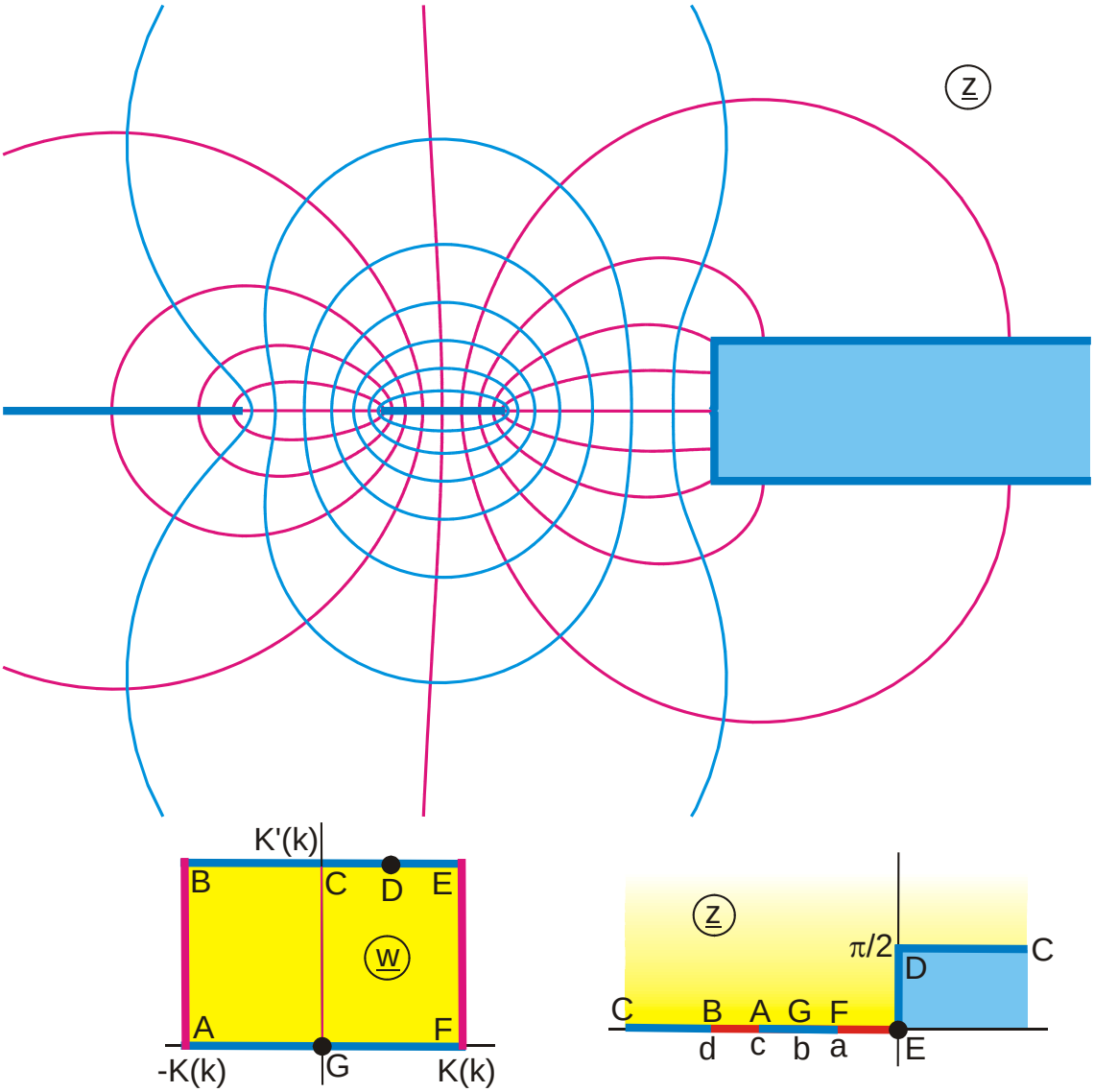


Abbildung P 6.3

$$z = \sqrt{w_1}\sqrt{w_1 - 1} + j\arcsin\sqrt{w_1}$$

$$w_1 = \{sn(w,k) - 1/k\}f$$

$$a,b,c = \sqrt{x^2 + x} + \operatorname{ar\,sinh}\sqrt{x}$$

gegeben: f, k

a: $x = \left(\frac{1}{k} - 1\right)f$

b: $x = \frac{f}{k}$

c: $x = \left(\frac{1}{k} + 1\right)f$

d: $x = \frac{2f}{k}$

$-K(k) \le u \le K(k)$

$0 \le v \le K'(k)$

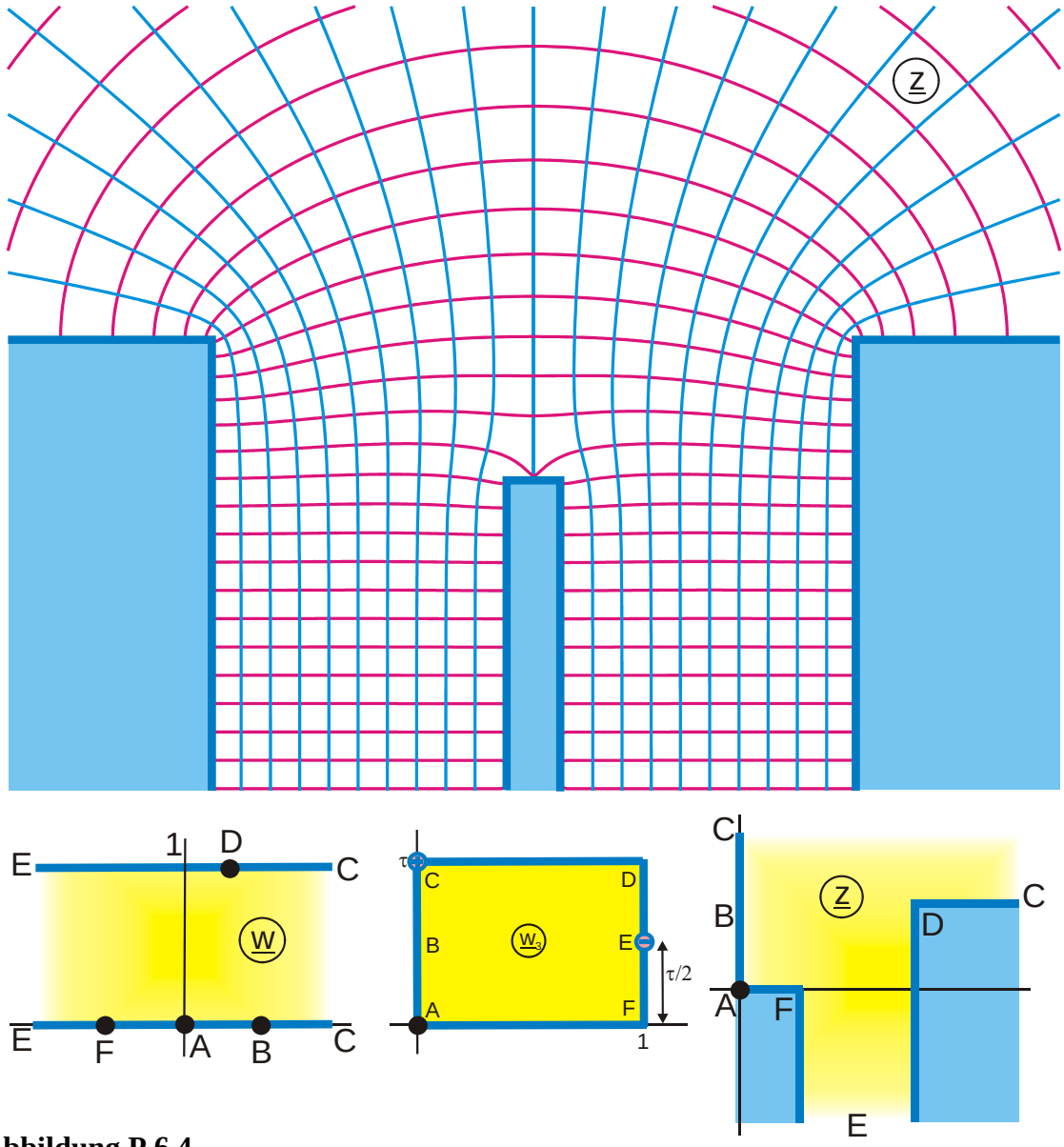


Abbildung P 6.4

$$z = \left[d \ln \frac{cn(w_3,k) + jk'sn(w_3,k)}{cn(w_3,k) - jk'sn(w_3,k)} - j\pi \left\{ Z_e(w_3,k) - \frac{cn(w_3,k)}{sn(w_3,k)}\left[1 - dn(w_3,k)\right] + c\pi w_3 \right\} \right] \exp\left(j\frac{\pi}{2} \right)$$

$$w_3 = K(k)\left(\frac{w_2^*}{K(k_1)} + j\tau \right) \qquad w_2 = \frac{F_a(w_1,k_1)}{K(k_1)}$$

$$w_1 = \frac{a}{\sqrt{1-\exp(w\pi)}} \qquad a = \mathrm{Re}\left\{ \left(1 + j\frac{\tau}{2}\right) K(k_1), k_1 \right\}$$

$$\tau = \frac{2K'(k)}{K(k)} \qquad k_1 = \left[\frac{\vartheta_2(0,\tau)}{\vartheta_3(0,\tau)} \right]^2$$

gegeben: k, c, d

k = 0,69 d = 1,15 c = 0,24

-1,5 ≤ u ≤ 1,5 0 ≤ v ≤ 1

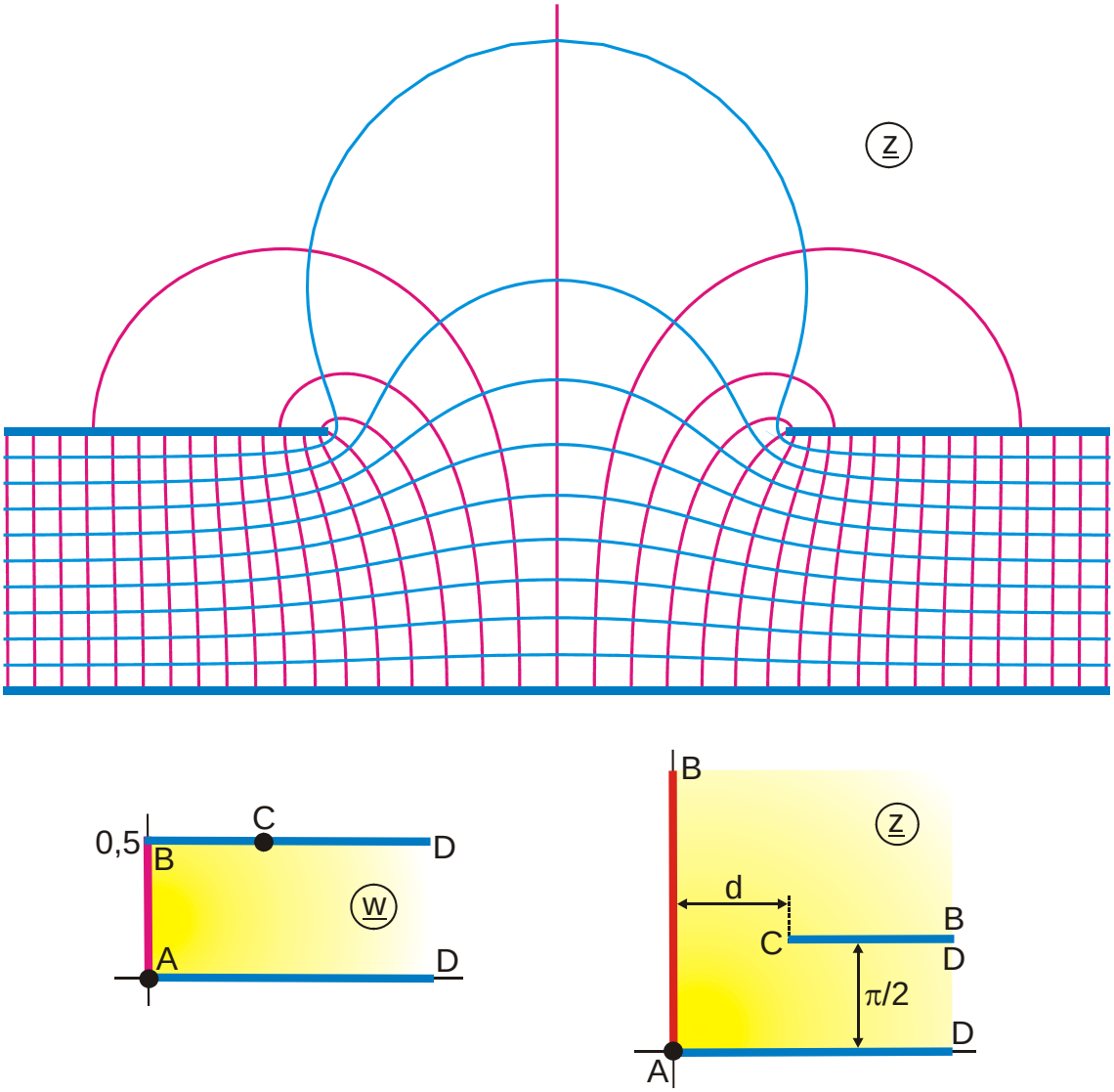


Abbildung P 7

$$z = \pi w + a \tanh(\pi w)$$

$$d = \operatorname{ar\,sinh}\sqrt{a} + \sqrt{a(a+1)} \qquad \text{gegeben: } a$$

$$u_C = \frac{1}{\pi}\ln\left(\sqrt{a} + \sqrt{1+a}\right)$$

$0 \le u \le 1{,}5$ $\qquad$ $0 \le v \le 0{,}5$

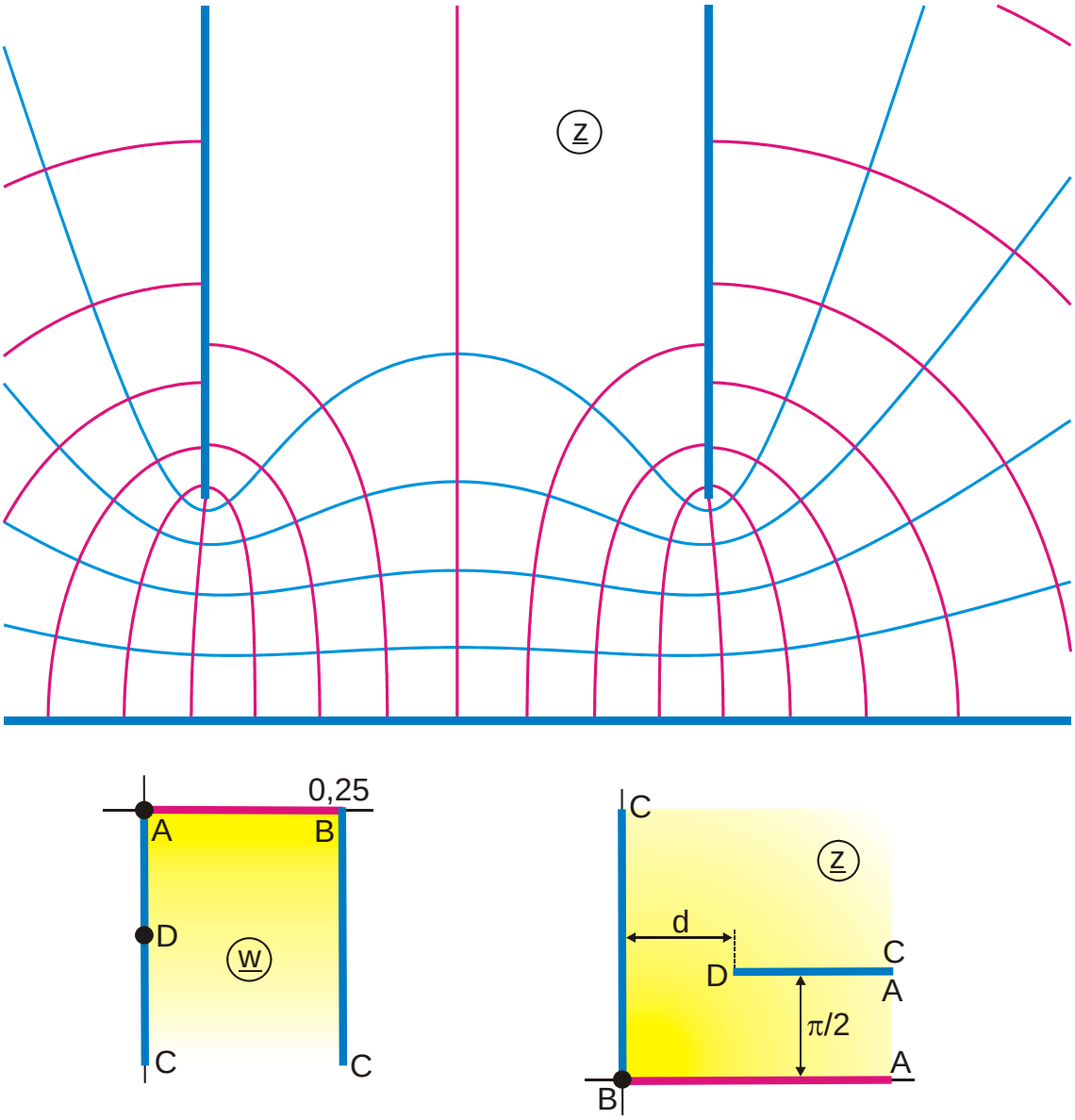


Abbildung P 7.1

$z = w_1 + a \tanh w_1$

$w_1 = -\ln \tan(w\pi)$

$d = \operatorname{ar\,sinh}\sqrt{a} + \sqrt{a(a+1)}$

gegeben: a

$v_D = -\frac{1}{\pi} \operatorname{ar\,tanh} \frac{1}{\sqrt{a} + \sqrt{1+a}}$

$0 \le u \le 0{,}25$

$-0{,}5 \le v \le 0$

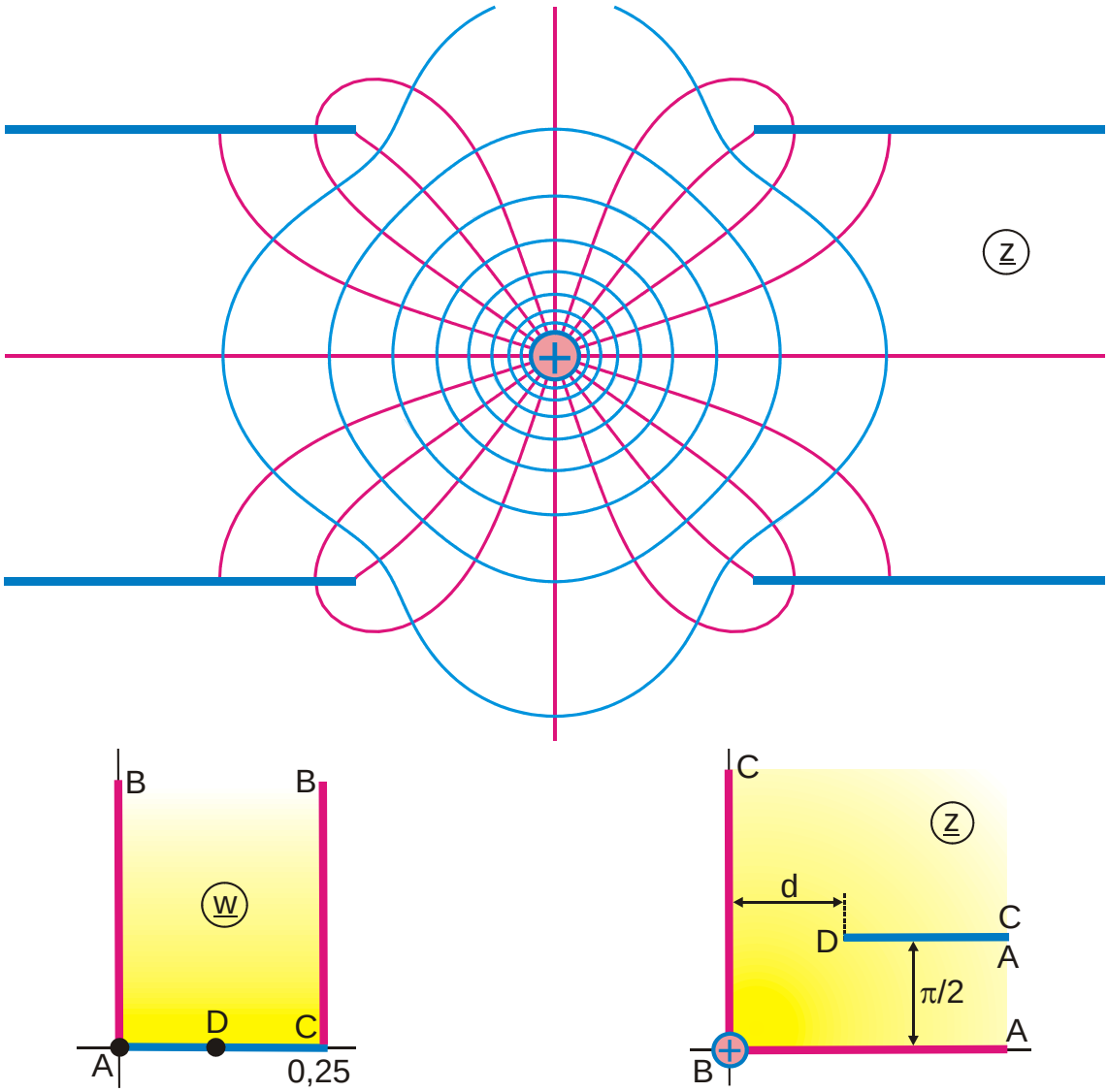


Abbildung P 7.2

$z = w_1 + a \tanh w_1$

$w_1 = j\pi/2 - \ln \tan(w\pi)$

$d = \operatorname{ar\,sinh}\sqrt{a} + \sqrt{a(a+1)}$

gegeben: a

$u_D = \frac{1}{\pi} \arctan \frac{1}{\sqrt{a} + \sqrt{1+a}}$

$0 \le u \le 0{,}25$

$0 \le v \le 0{,}5$

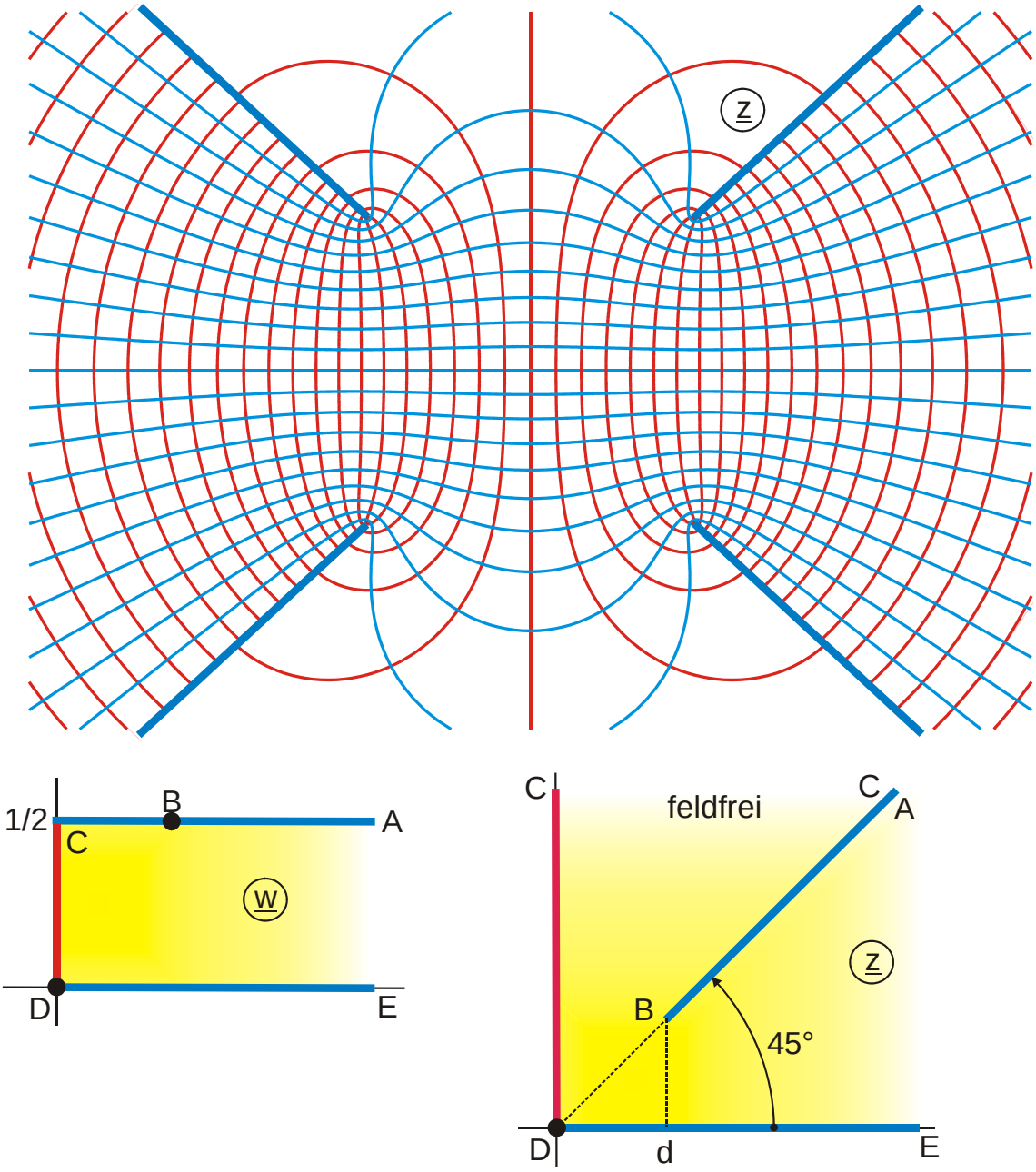


Abbildung P 7.3

$$z = B_a(w_1, k) + jB_a(w_2, k) - h - jh$$

$$d = \sqrt{2}$$

$$w_1 = \sqrt{1 + w_0}$$

$$w_2 = \sqrt{1 + 1/w_0}$$

$$w_0 = \cosh(w\pi)$$

$$u_B = \frac{1}{\pi} \operatorname{ar\,sinh}(1)$$

$$k = 1/\sqrt{2}$$

$$h = 2E(k) - K(k)$$

$$0 \le u \le 1{,}5$$

$$0 \le v \le 0{,}5$$

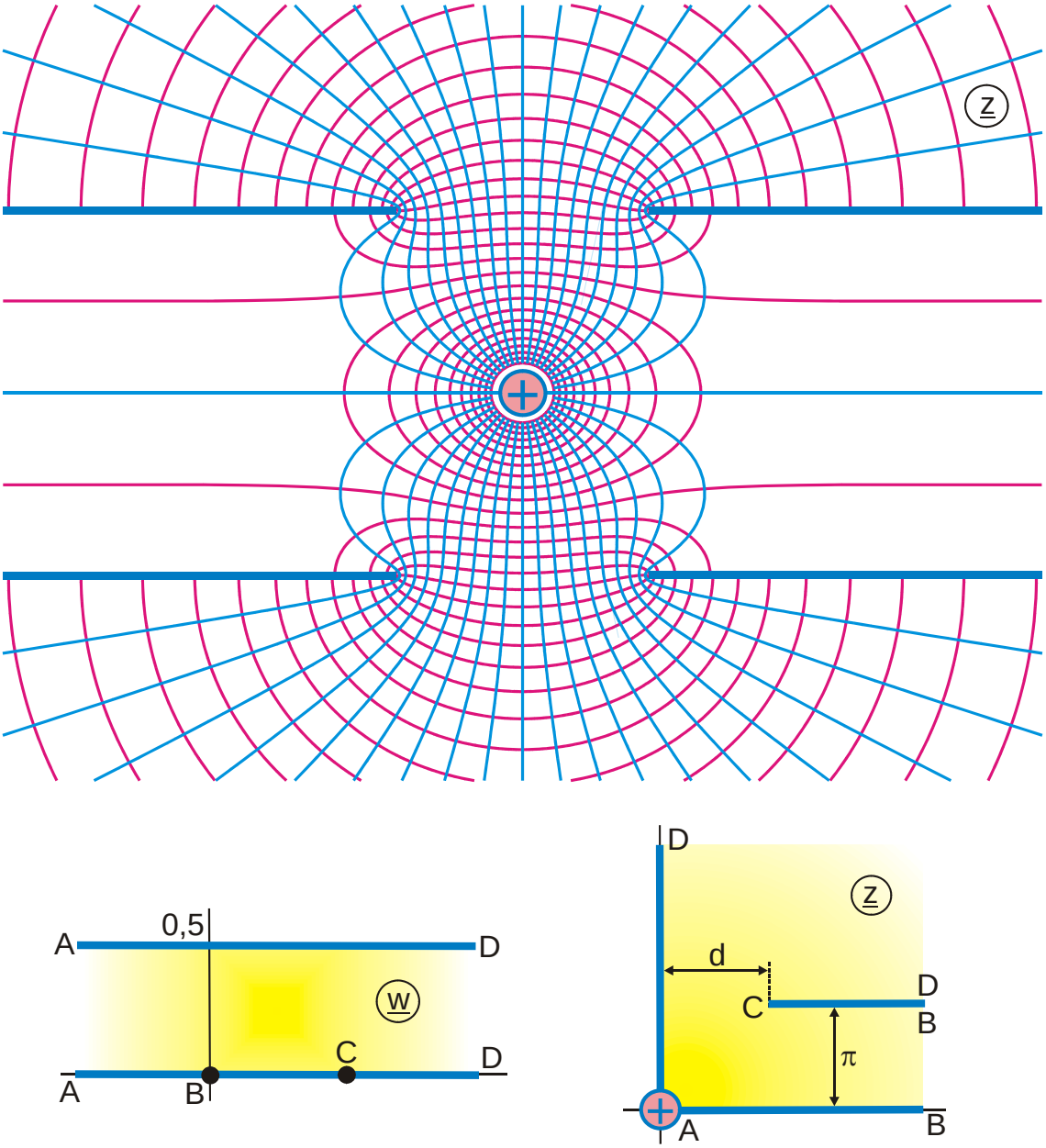


Abbildung P 7.4

$$z = bw_1 + \ln\frac{w_1 + 1}{w_1 - 1} + j\frac{\pi}{2}$$

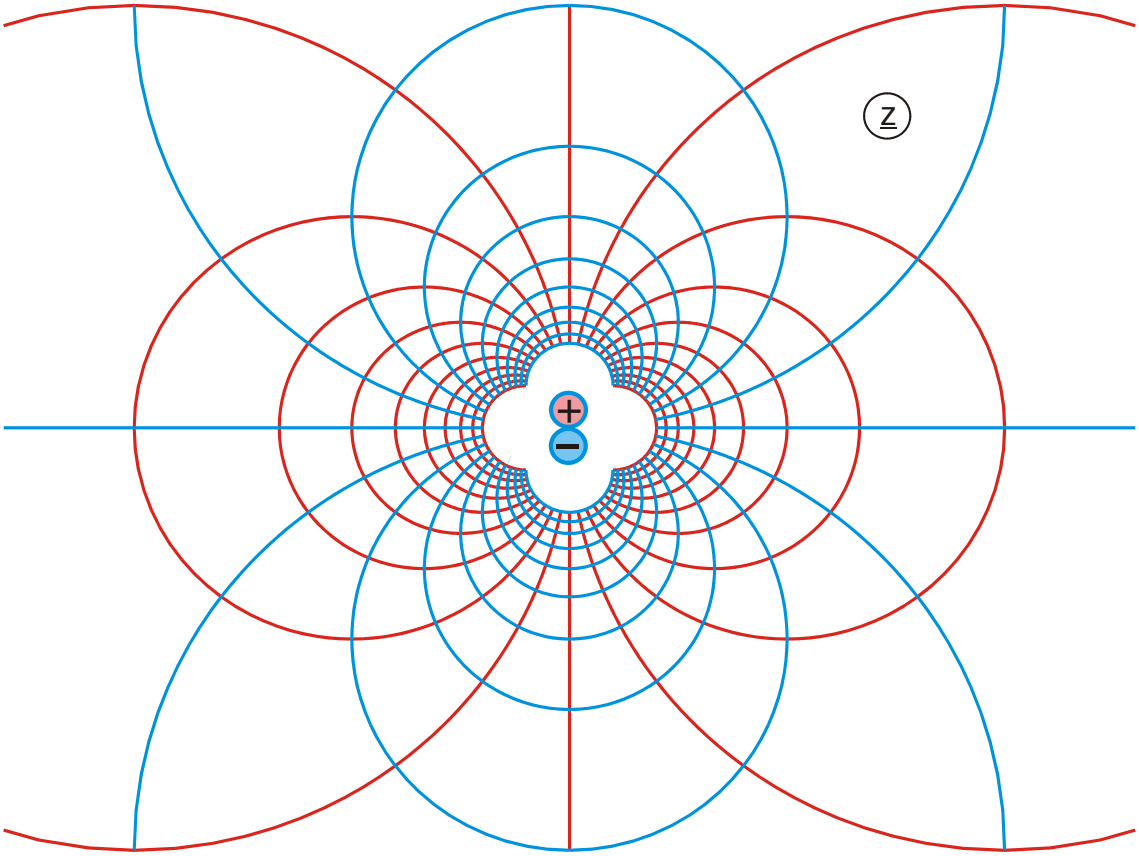
$$w_1 = \exp(w\pi)$$

gegeben: b

$-0{,}5 \le u \le 1{,}0$ $\qquad$ $0 \le v \le 0{,}5$

Abbildungen Gruppe Q

Dipolfelder



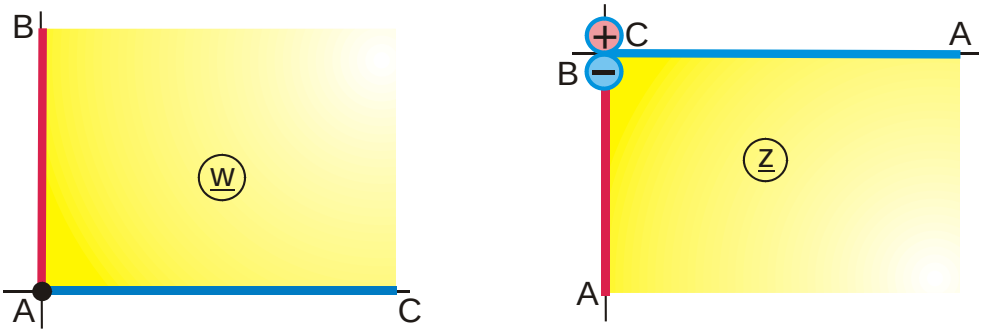


Abbildung Q 1 (tangentiale Kreise)

z = 1/w

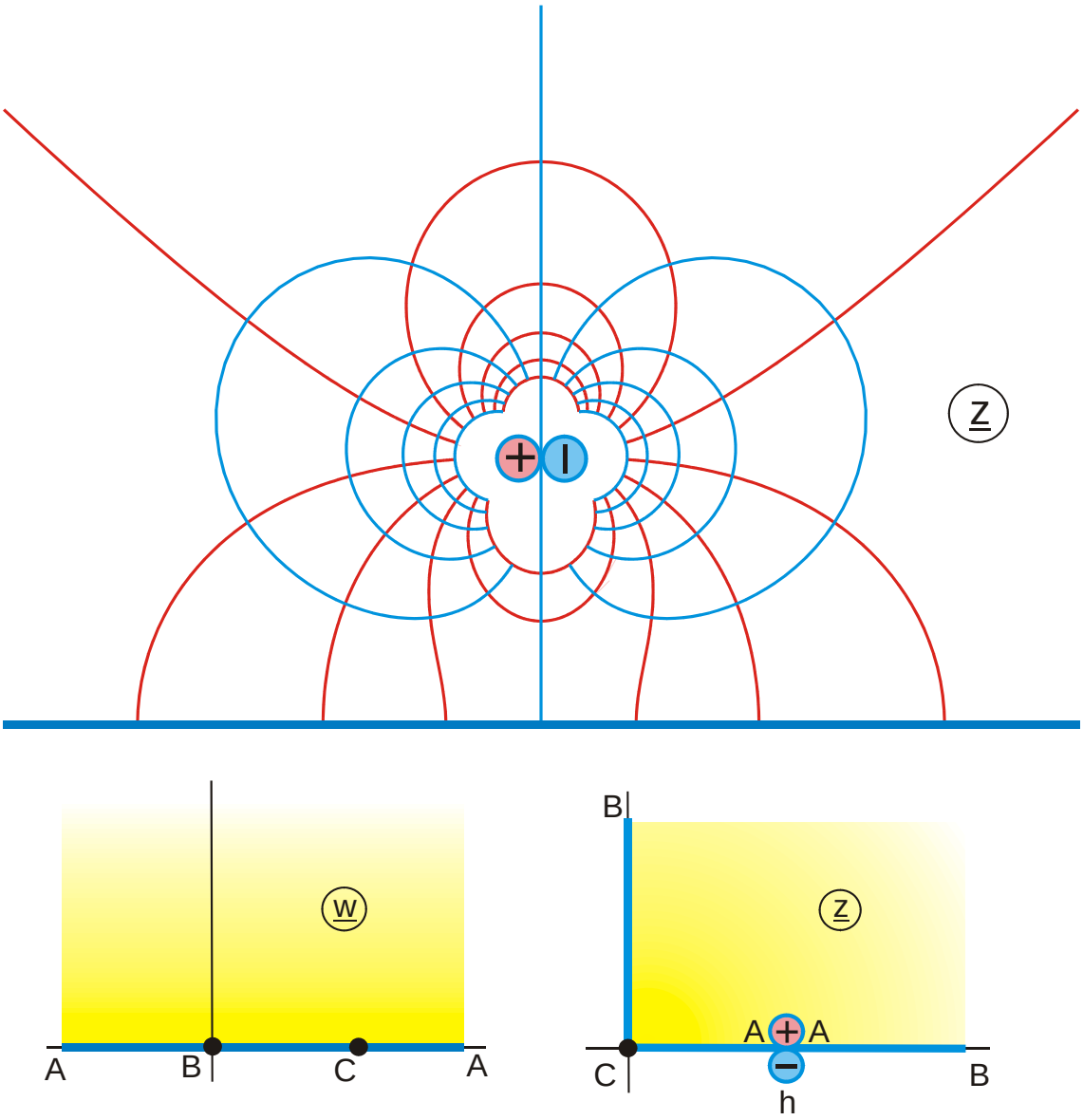


Abbildung Q 2

$z = \sqrt{a - 1/w}$

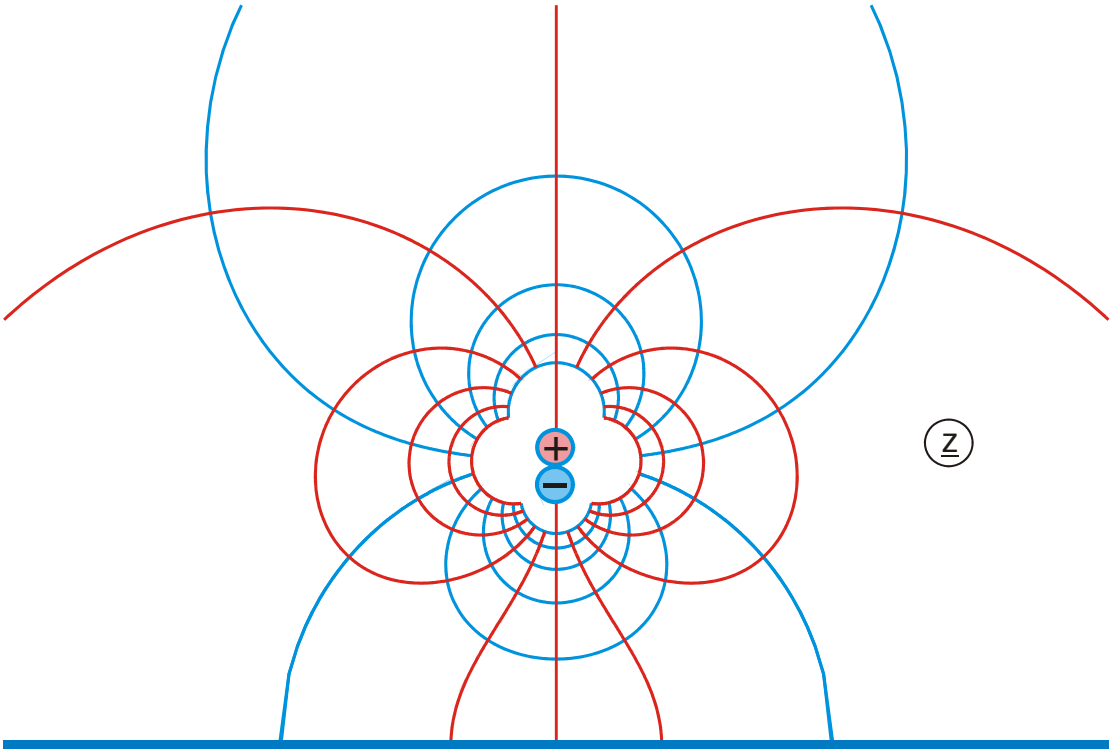
$a = h^2$

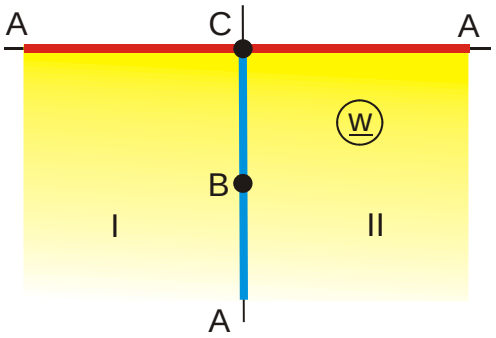
$-1 \le u \le 1$

$0 \le v \le 1$

$u_C = \frac{1}{a}$

$h = 1{,}21267$





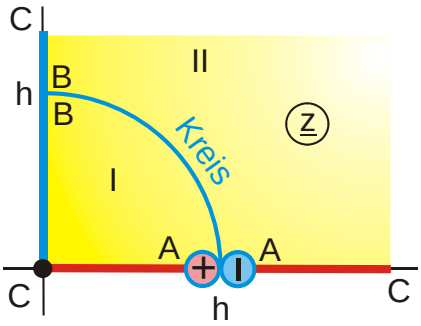


Abbildung Q 2.1

$$z = \pm\sqrt{\frac{1}{w^2} + h^2} + \frac{1}{w}$$

\+ : Bereich II

\- : Bereich I

$-4 \le u \le 4$

$-4 \le v \le 0$

$v_B = \frac{1}{h}$

$h = 0{,}83333$

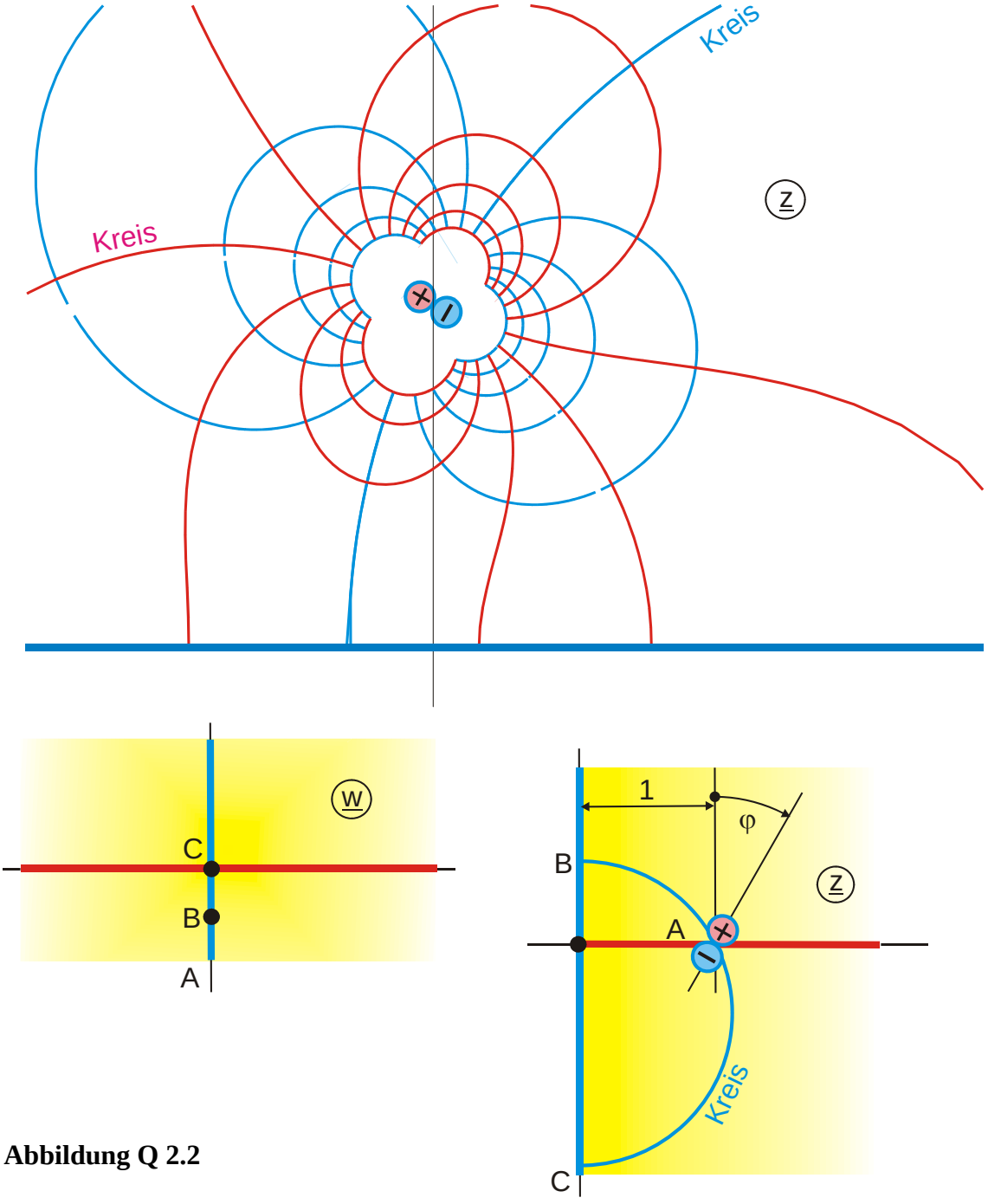


Abbildung Q 2.2

$$z = \frac{1}{w}\left(\sin\varphi + \sqrt{w^2 + j2w\cos\varphi + \sin^2\varphi}\right)$$

$-4 \le u \le 4$ $\qquad -4 \le v \le 4$

$0 \le |\varphi| \le 90°$ $\qquad \varphi = 28{,}35°$

Kreise für v = ±1

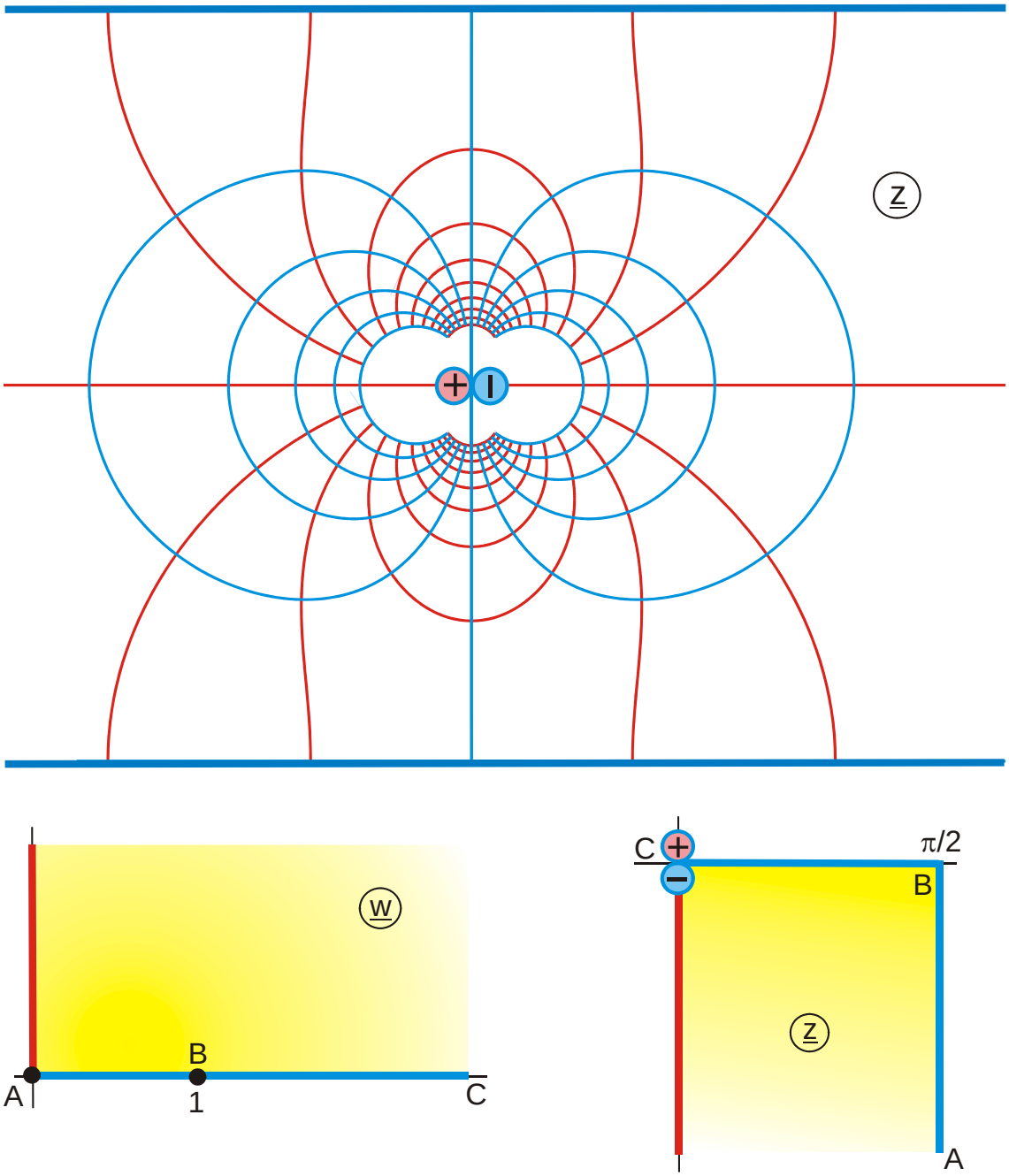


Abbildung Q 3

$z = \arcsin(1/w)$

$0 \le u \le 4$ $0 \le v \le 2$

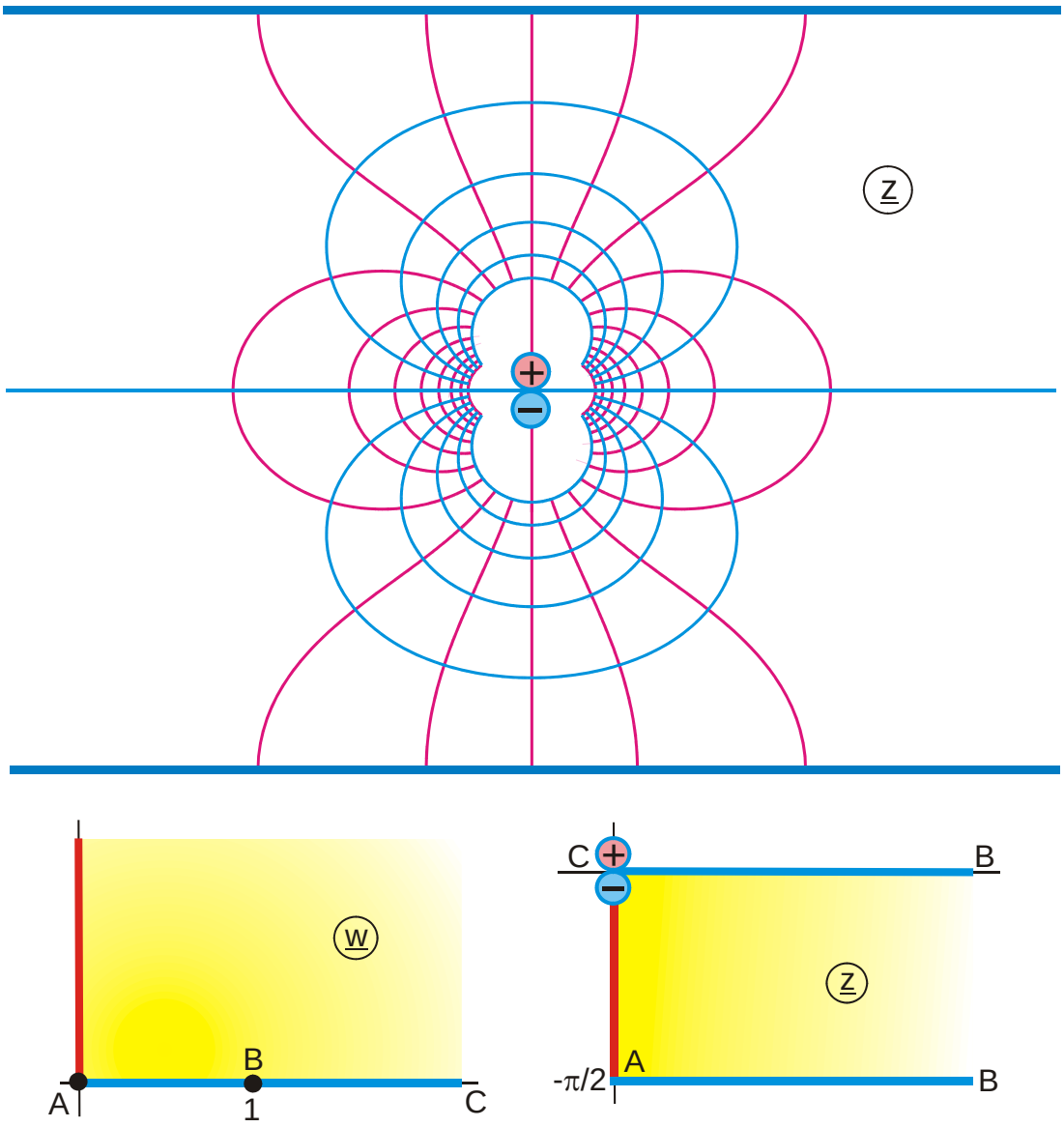


Abbildung Q 3.1

$z = \operatorname{ar}\tanh(1/w)$

$0 \le u \le 4$ $0 \le v \le 2$

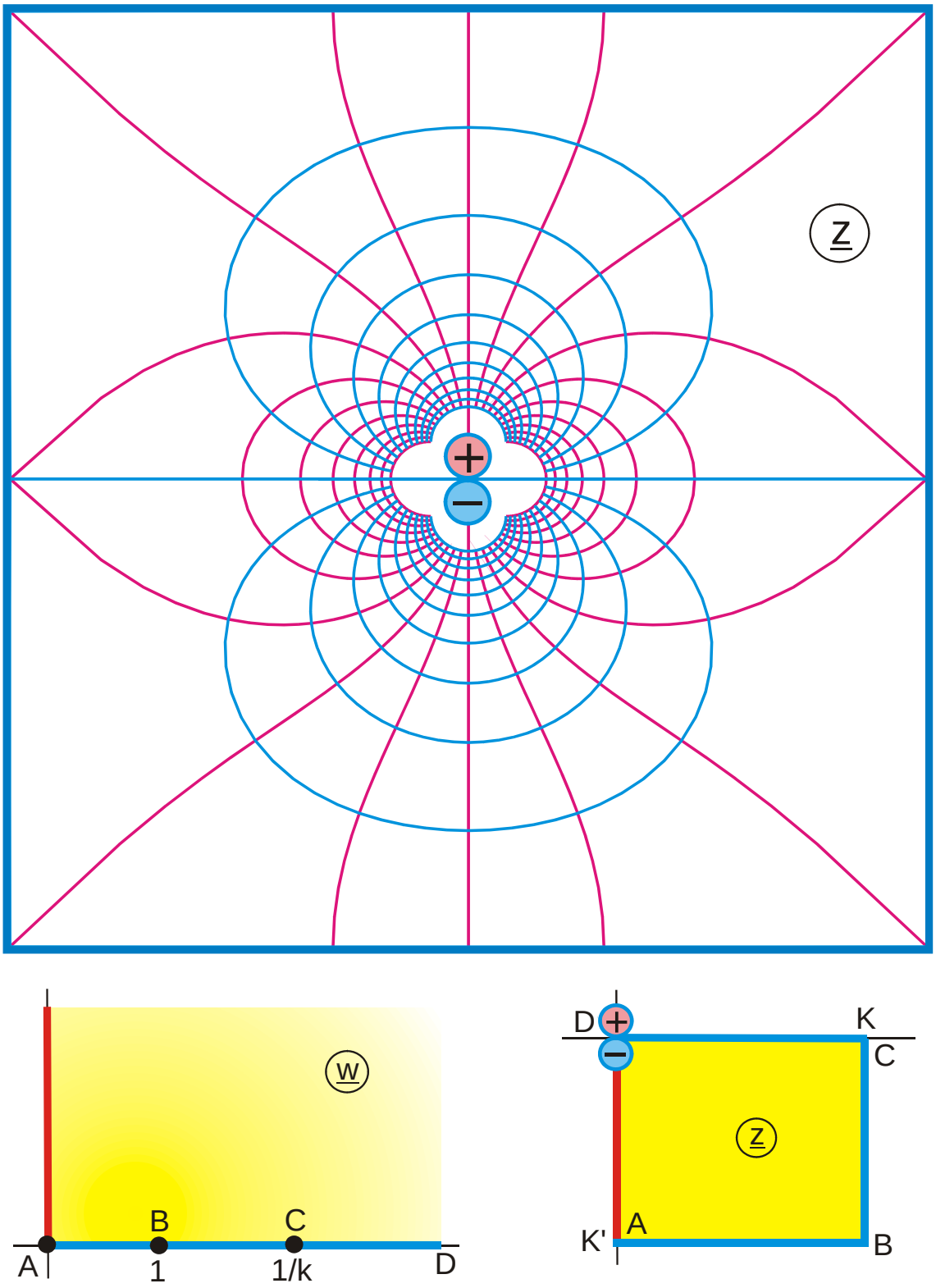


Abbildung Q 4

$z = F_a(w,k) - jK'$ $\qquad$ $1/k = 1{,}5$

$0 \le u \le 5$ $\qquad$ $0 \le v \le 5$

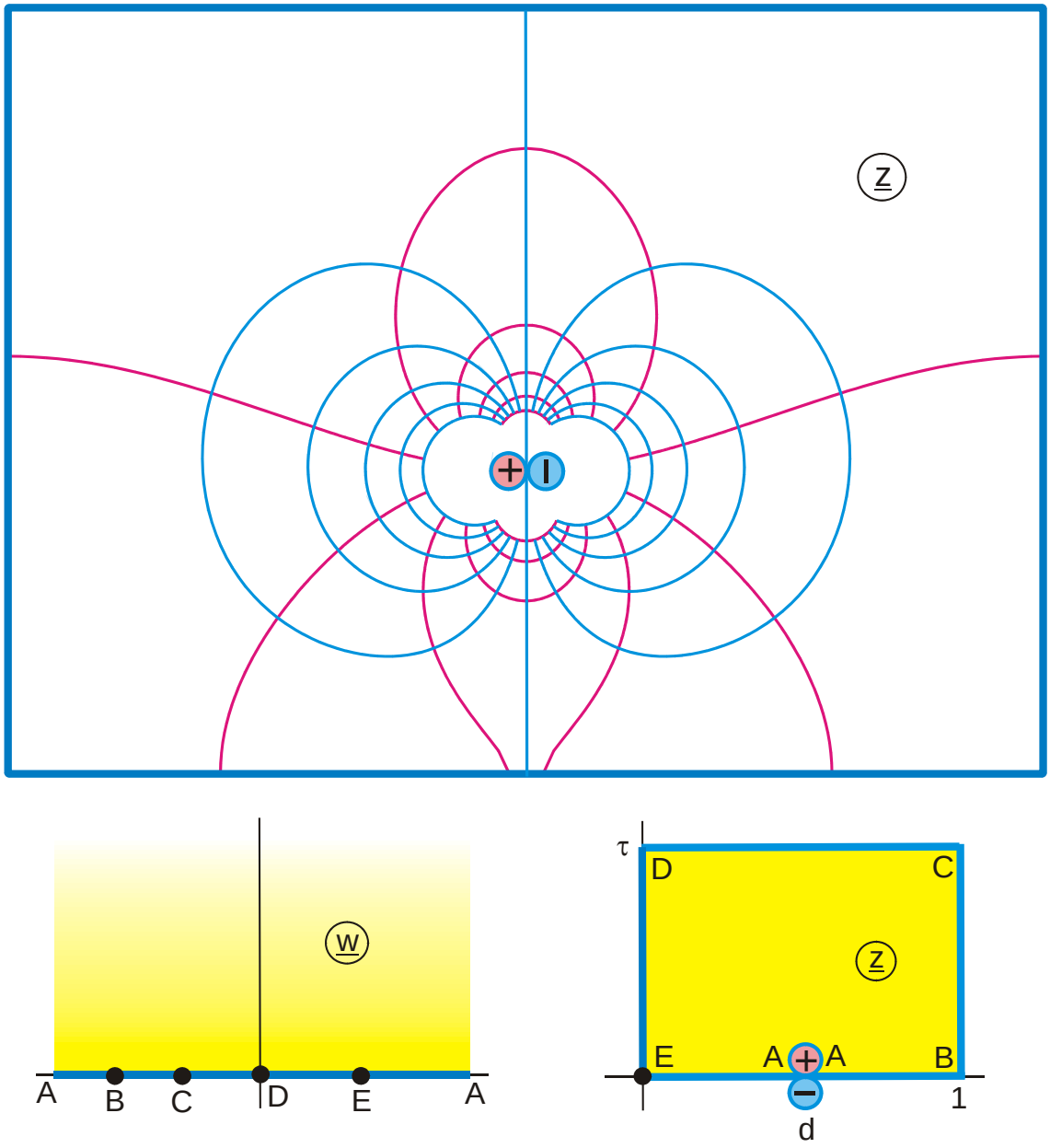


Abbildung Q 4.1

$$z = \frac{F_a(w_1, k)}{K(k)}$$

$$w_1 = \sqrt{a - 1/w)}$$

$$k = \left[\frac{\vartheta_2(0,\tau)}{\vartheta_3(0,\tau)}\right]^2$$

$$a = \mathrm{sn}^2\left[\mathrm{dK(k)}, \mathrm{k}\right]$$

$$u_B = \frac{1}{a-1}$$

$$u_C = \frac{1}{a - 1/k^2}$$

$u_E = 1/a$

a = 1 für d = 1

$0 \le v \le 4$

$-8 \le u \le 6$

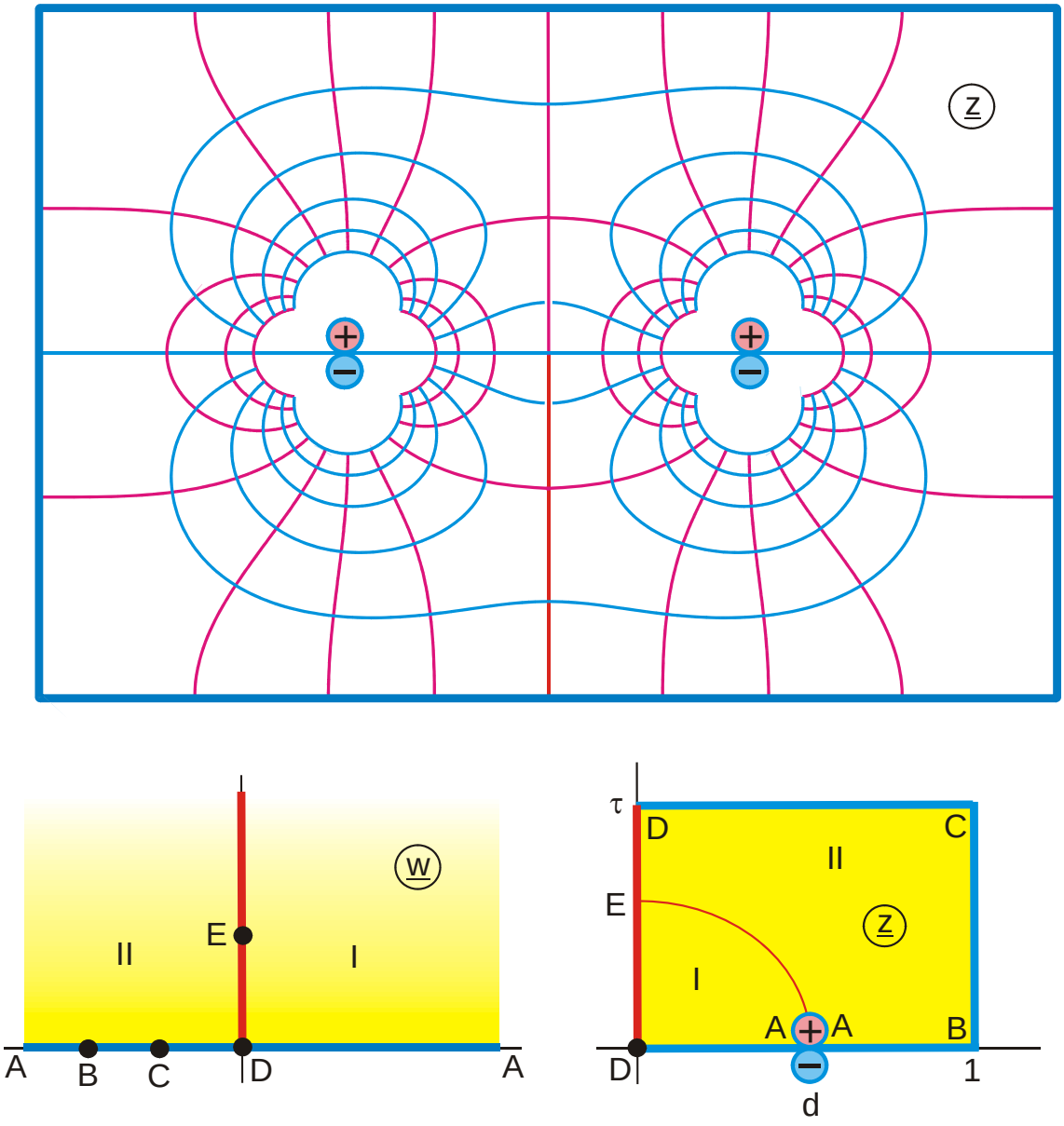


Abbildung Q 4.2

$$z = \frac{F_a(w_1, k)}{K(k)}$$

$$w_1 = \sqrt{\frac{1}{w^2} + h^2} - \frac{1}{w}$$

$$\mathrm{k} = \left[\frac{\vartheta_2(0,\tau)}{\vartheta_3(0,\tau)}\right]^2$$

$$\mathrm{h} = \mathrm{sn}\left[\mathrm{dK(k)}, \mathrm{k}\right]$$

$$u_B = \frac{2}{h^2 - 1}$$

$$u_C = \frac{2k}{k^2 h^2 - 1}$$

$0 \le \mathrm{v} \le 4$

$-7 \le \mathrm{u} \le 3$

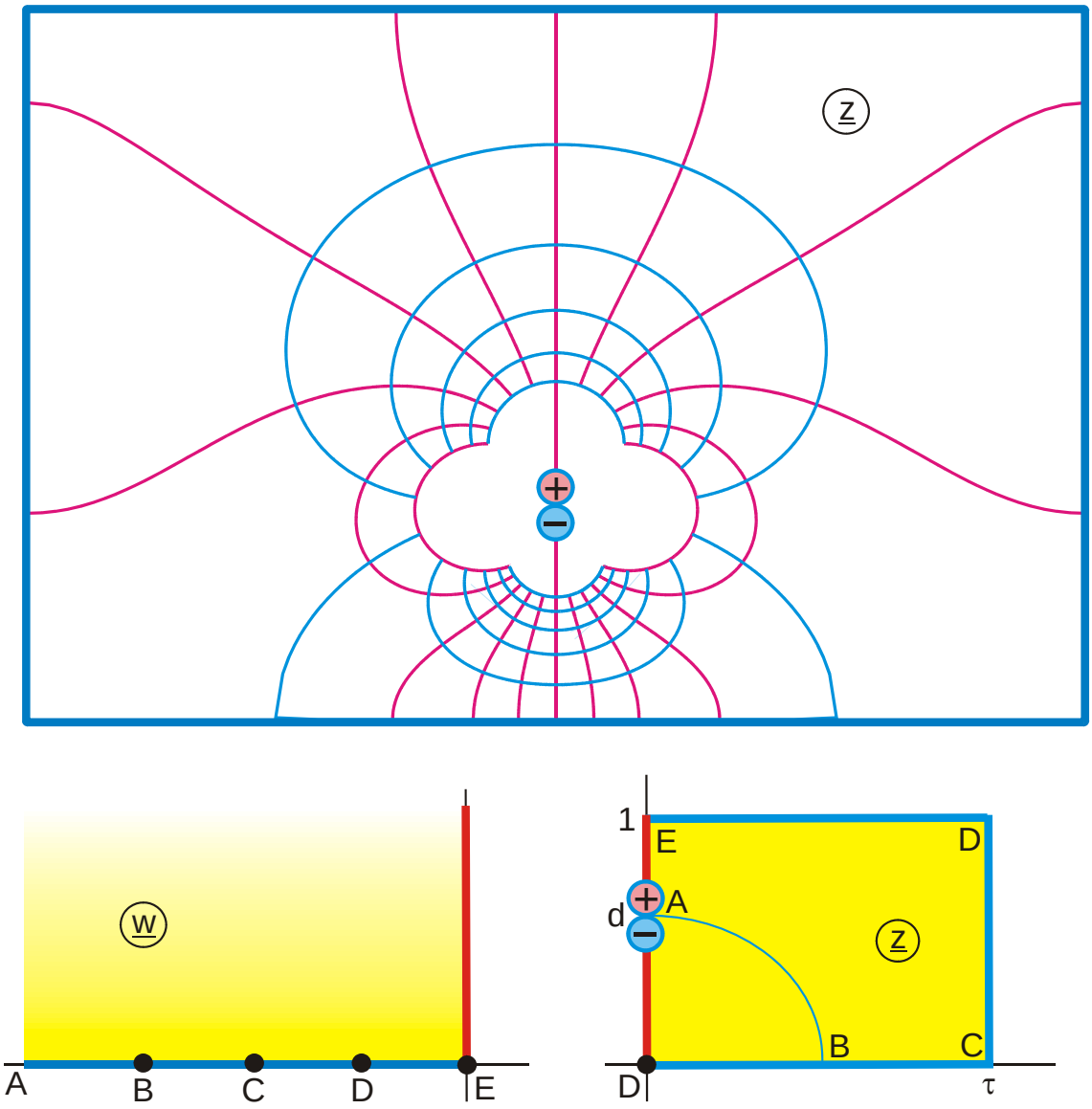


Abbildung Q 4.3

$$z = \frac{F_a(w_1, k)}{K'(k)}$$

$$w_1 = \sqrt{\frac{1}{w^2} - h^2} \pm \frac{1}{w}$$

$$\mathrm{k} = \left[\frac{\vartheta_2(0, 1/\tau)}{\vartheta_3(0, 1/\tau)}\right]^2$$

$$\mathrm{h} = \mathrm{Im}\,\mathrm{sn}\left[\mathrm{jdK'(k), k}\right]$$

$$u_B = -\frac{1}{d}$$

$$u_C = \frac{2k}{k^2 h^2 - 1}$$

$$0 \le \mathrm{v} \le 2$$

$$-2 \le \mathrm{u} \le 0$$

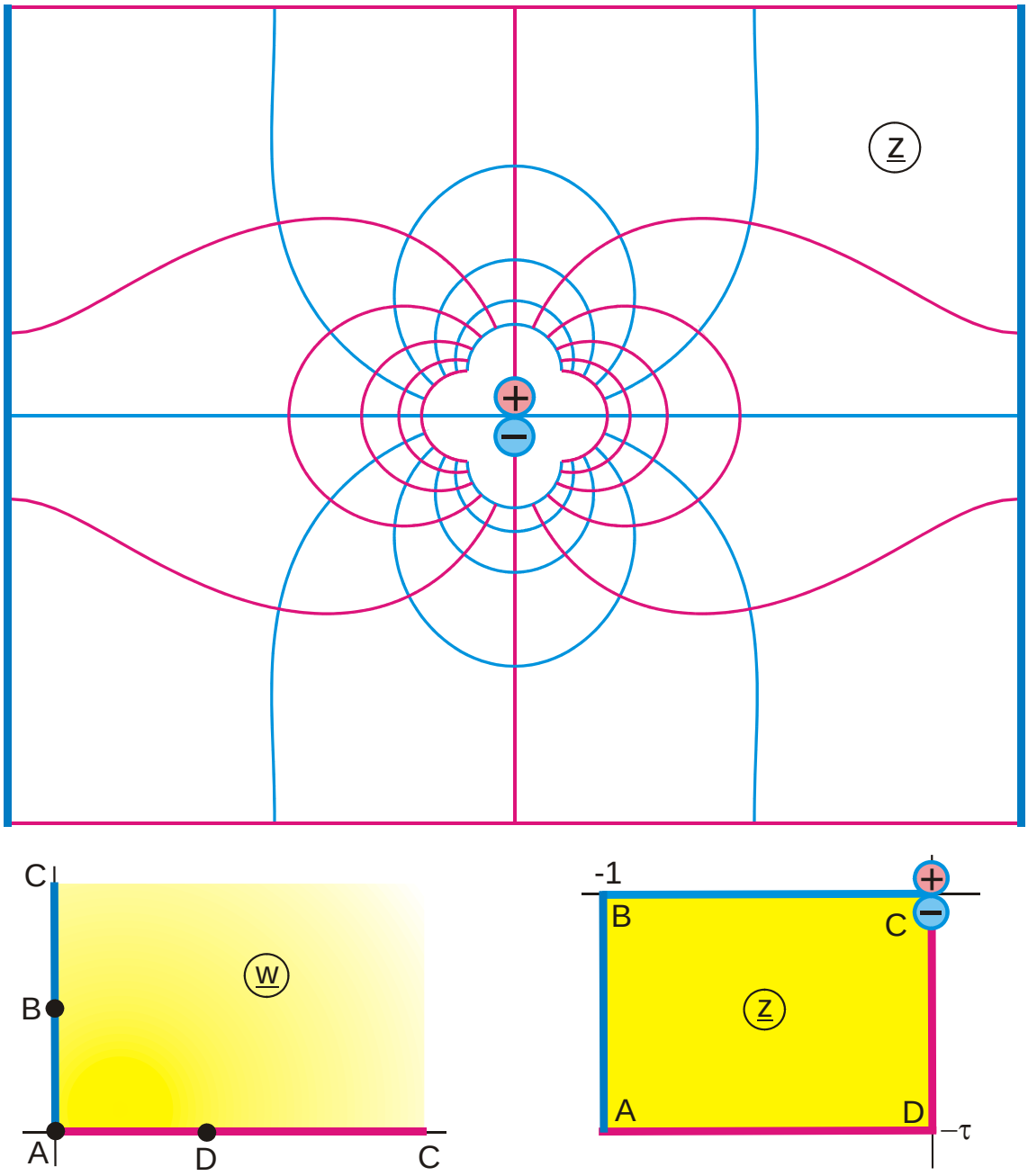


Abbildung Q 4.4

$$z = \frac{F_a(w\pi, jk_0) - K(jk_0) - jK'(jk_0)}{K(jk_0)}$$

$$k_0 = \sqrt{k'^2 - 1}$$

$$K(jk_0) = \frac{K(k_0/k')}{k'}$$

$0 \le v \le 1$

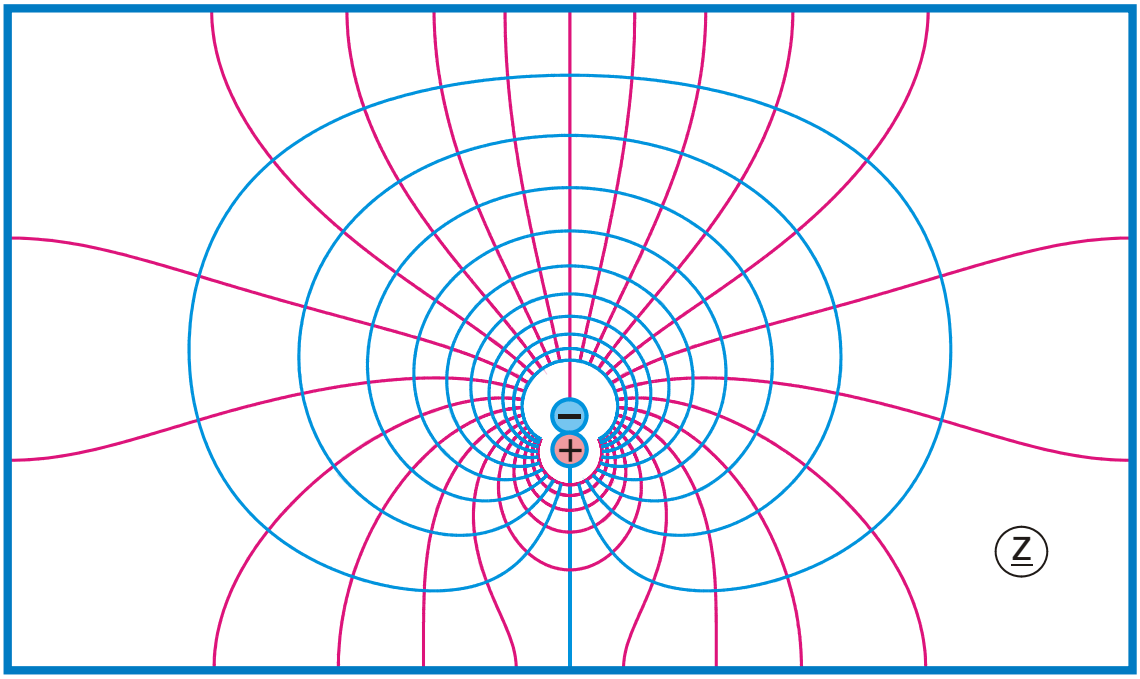
$\tau = 1$ für $k' = \sqrt{2}$

gegeben: k’ > 1

$$\tau = \frac{K'(jk_0)}{K(jk_0)}$$

$$K'(jk_0) = \frac{K(1/k')}{k'}$$

$0 \le u \le 1$



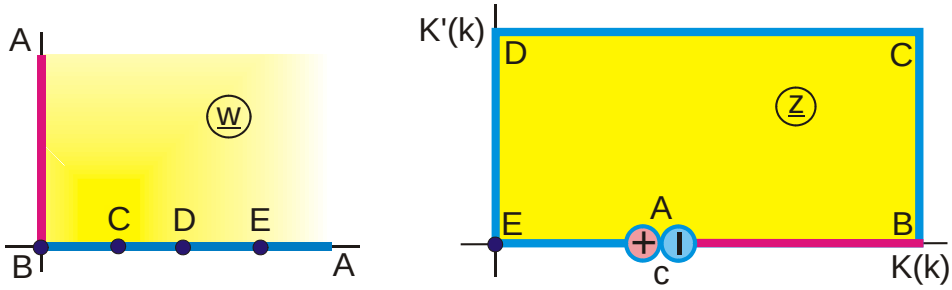


Abbildung Q 4.5

$w_0 = w^2 + 1/(b-1)$

$w_1 = \sqrt{b - 1/w_0}$

$z = F_a(w_1, k)$

gegeben: k, b

$0 \le u \le 3$ $0 \le v \le 2$

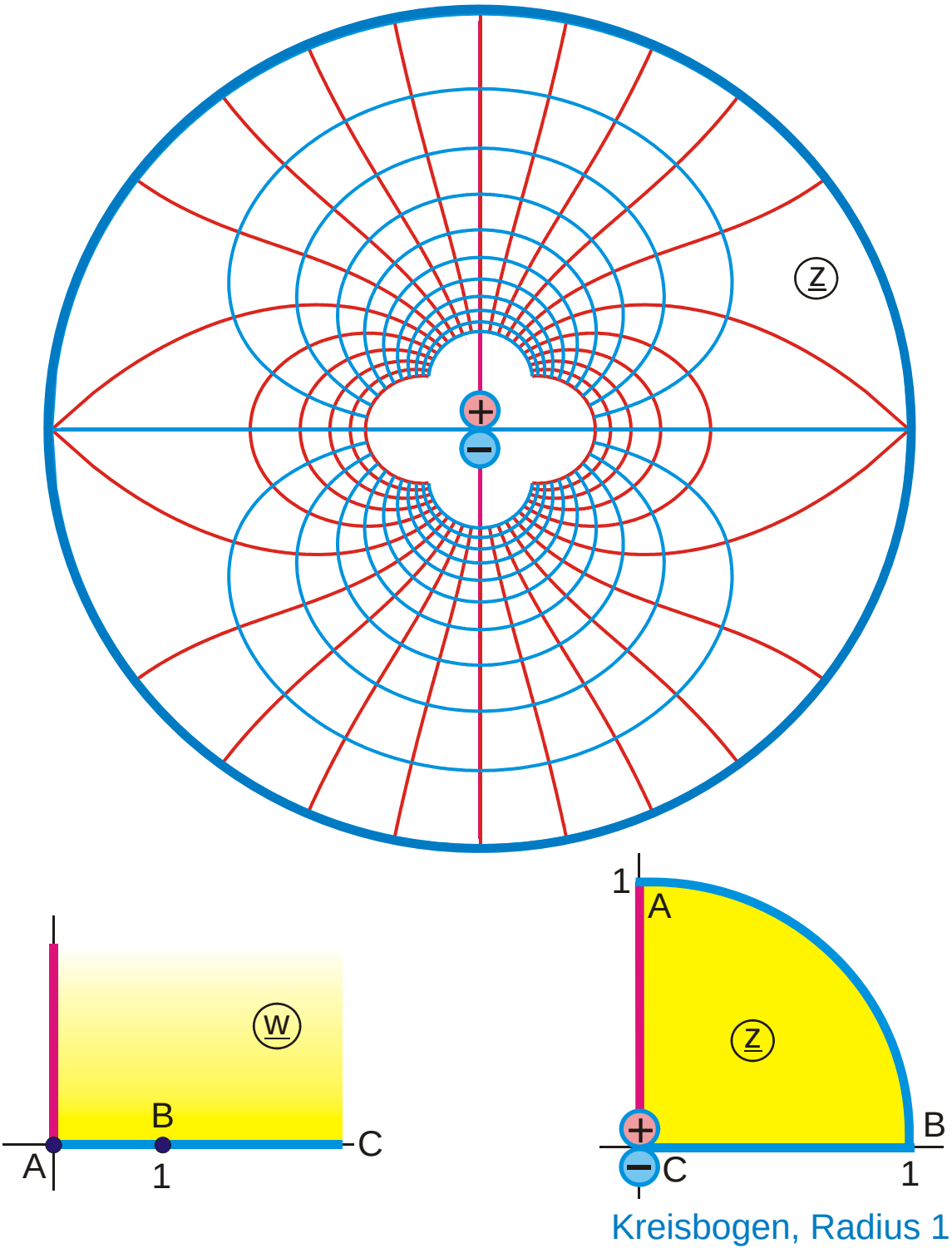


Abbildung Q 5

$$z = w - \sqrt{w^2 - 1}$$

$-2 \le u \le 2$ $\qquad$ $0 \le v \le 2$

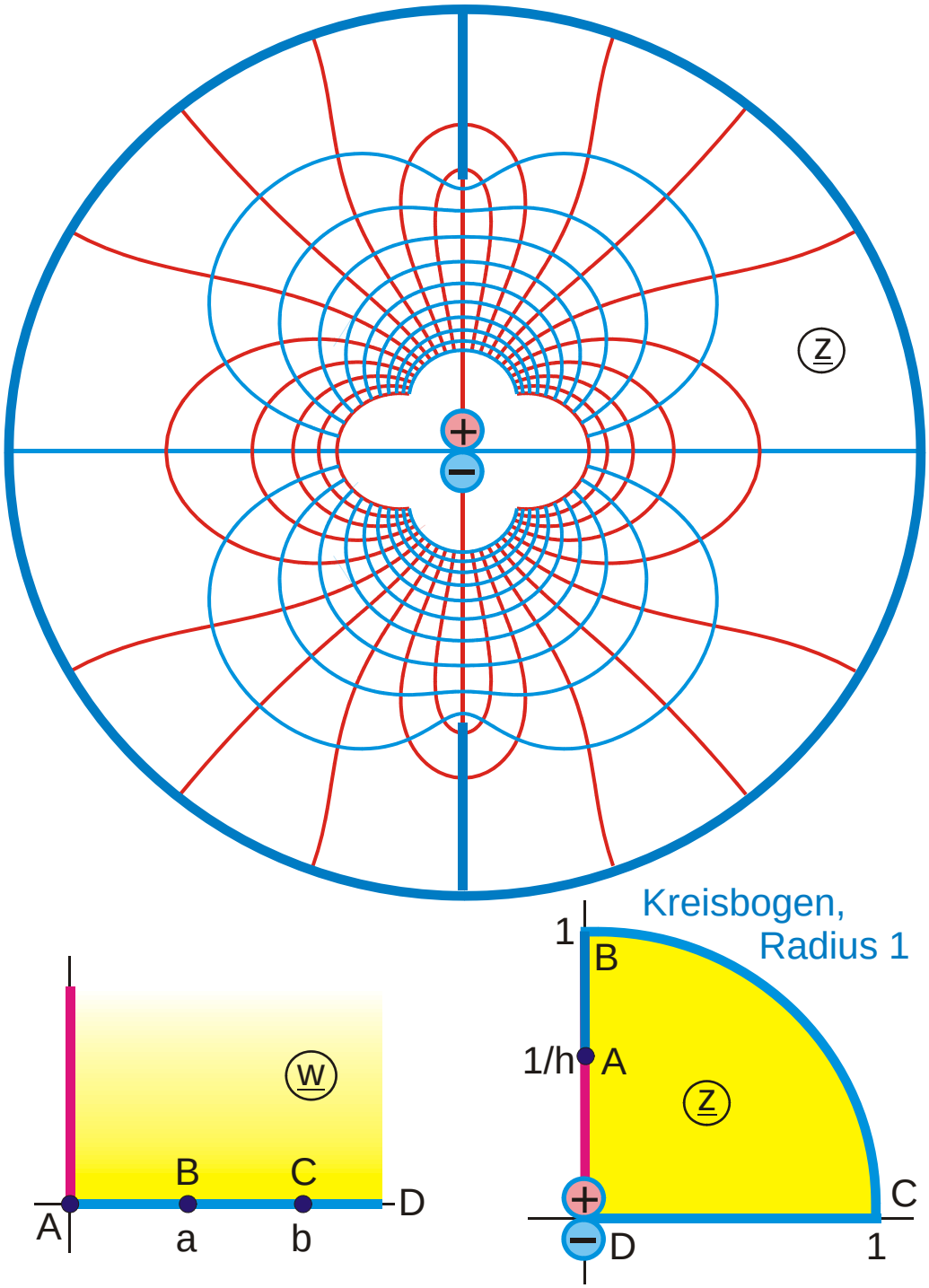


Abbildung Q 5.1

$z = t - \sqrt{t^2 - 1}$

$t = \sqrt{w^2 - a^2}$

$h = a + \sqrt{a^2 + 1}$

$a = \frac{h^2 - 1}{2h}$

$u_B = \sqrt{a^2 + 1}$

$-2{,}5 \le u \le 2{,}5$

$0 \le v \le 2{,}5$

Abbildungen Gruppe R

Leitende Elektroden im homogenen Feld

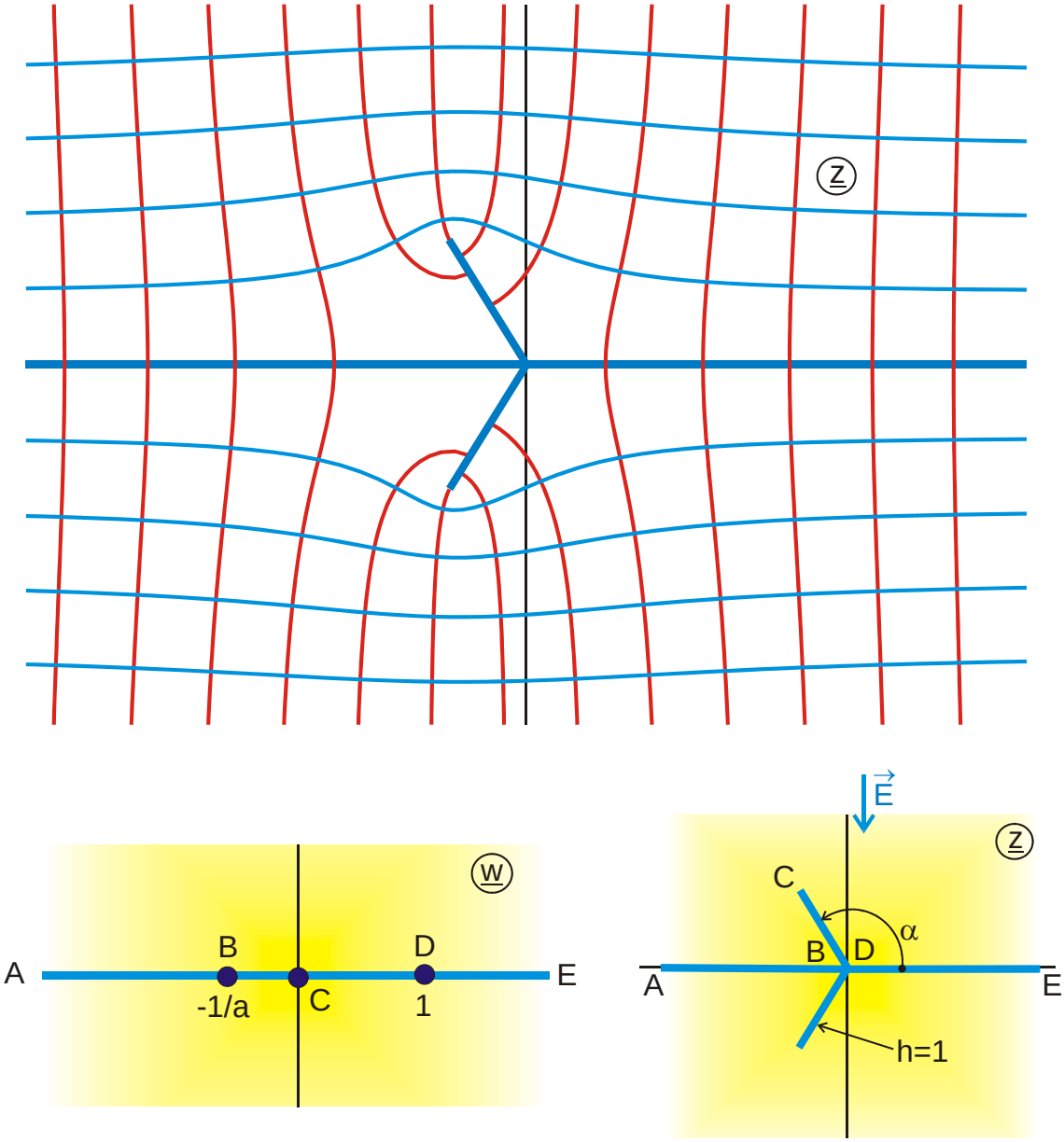


Abbildung R 1

$$z = (w-1)^{\alpha/\pi}(aw+1)^{1-\alpha/\pi}$$

$$a = \frac{\alpha}{\pi - \alpha}$$

$-4 \le u \le 4$ $\qquad$ $0 \le v \le 4$

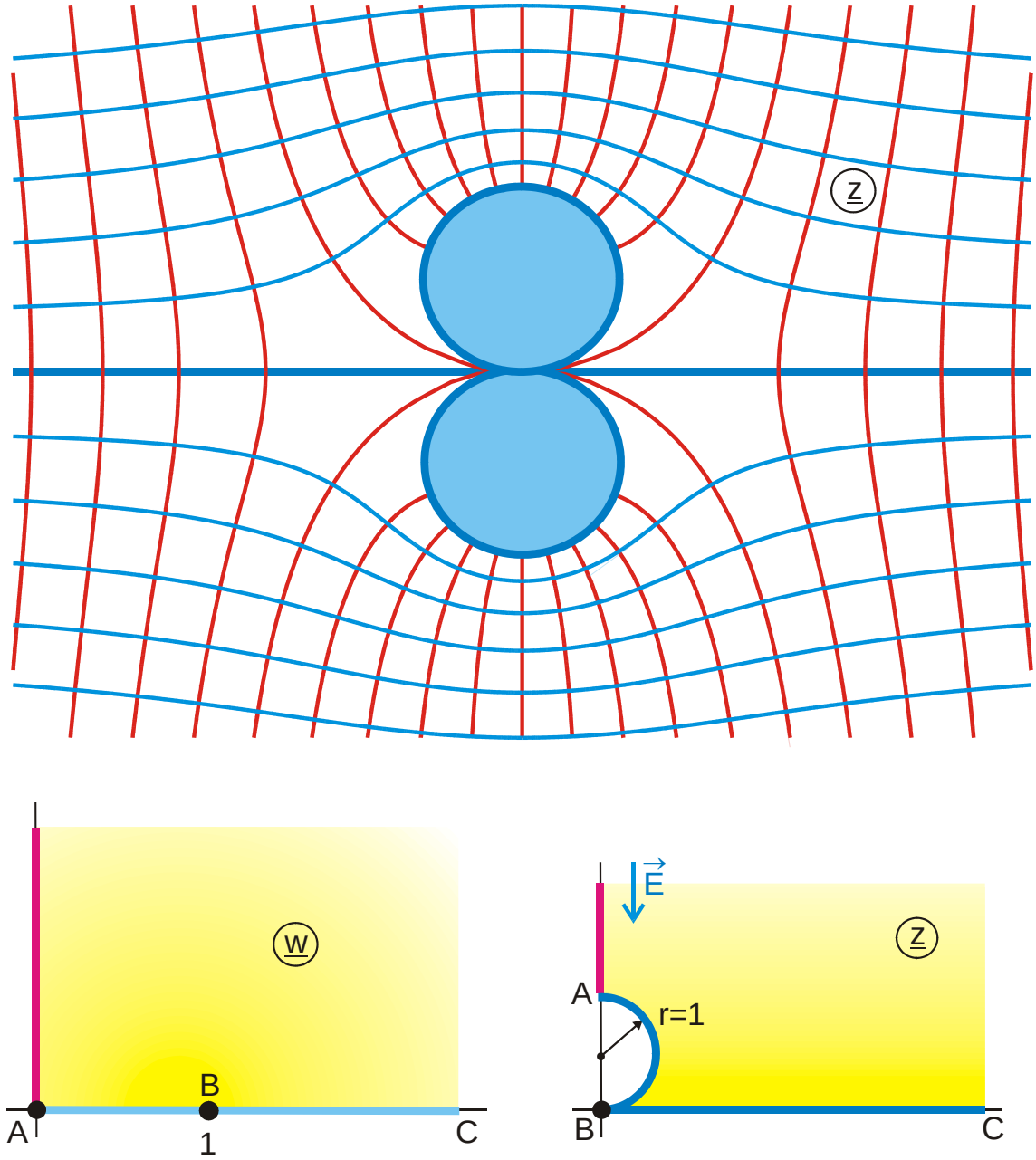


Abbildung R 2

$$z = \frac{2\pi}{\text{ar tanh}\,(1/w)}$$

$0 \le u \le 2$ $0 \le v \le 1$

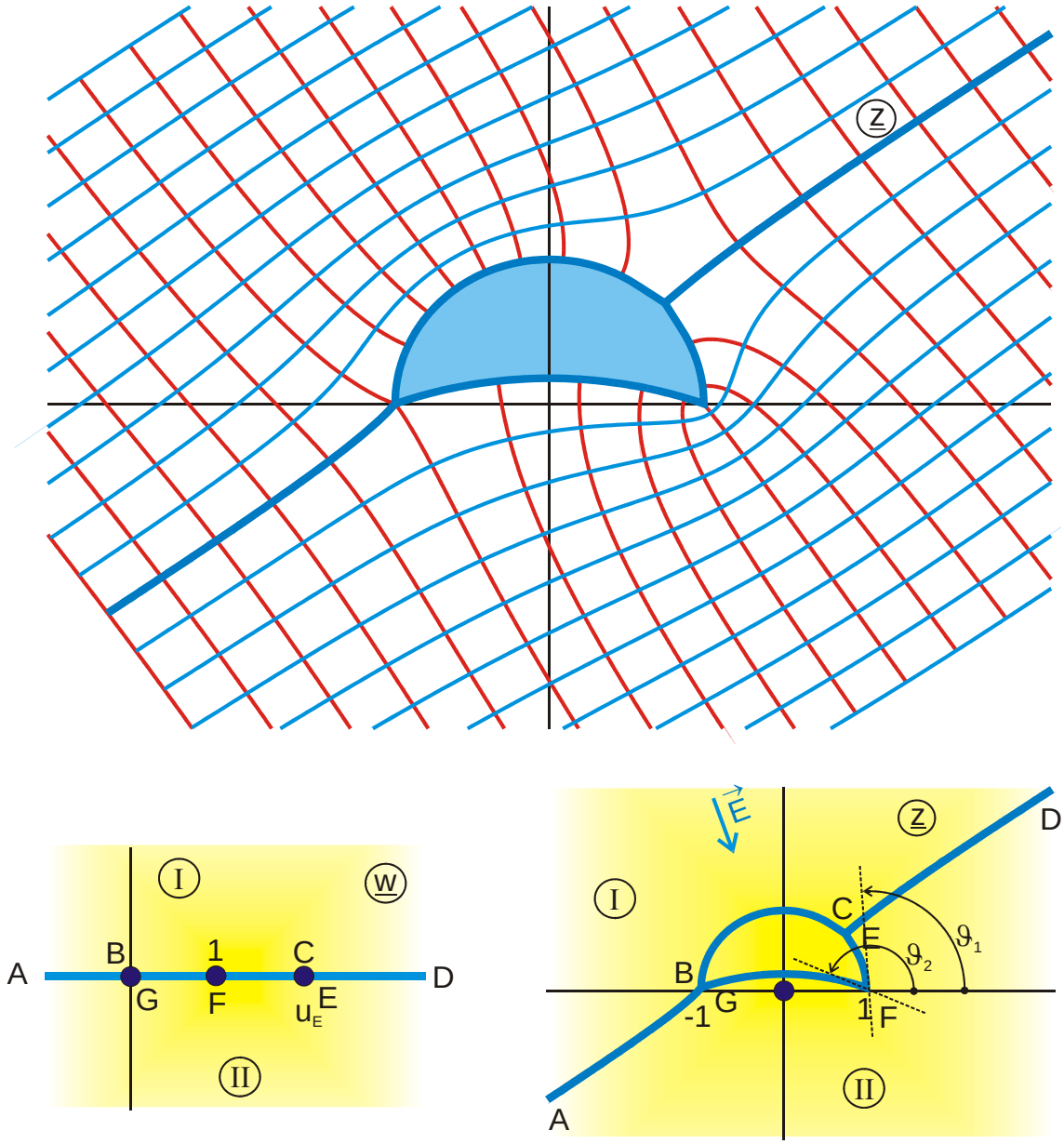


Abbildung R 2.1

$$z = \frac{1 + w_2}{1 - w_2}$$

$$w_2 = e^{j\vartheta_2}\ w_1^{(2-\vartheta_2/\pi+\vartheta_1/\pi)}$$

$$w_1 = a + j\sqrt{b^2 - 1/w}$$

$-1 \le u \le 3$

$-1{,}5 \le v \le 1{,}5$

gegeben: ϑ_1, ϑ_2

Einfallswinkel (E) = $f(\vartheta_1, \vartheta_2)$

$a = \cos\varphi$

$b = \sin\varphi$

$$\varphi = \frac{2\pi - \vartheta_2}{2 - \vartheta_2/\pi + \vartheta_1/\pi}$$

$u_E = 1/b^2$

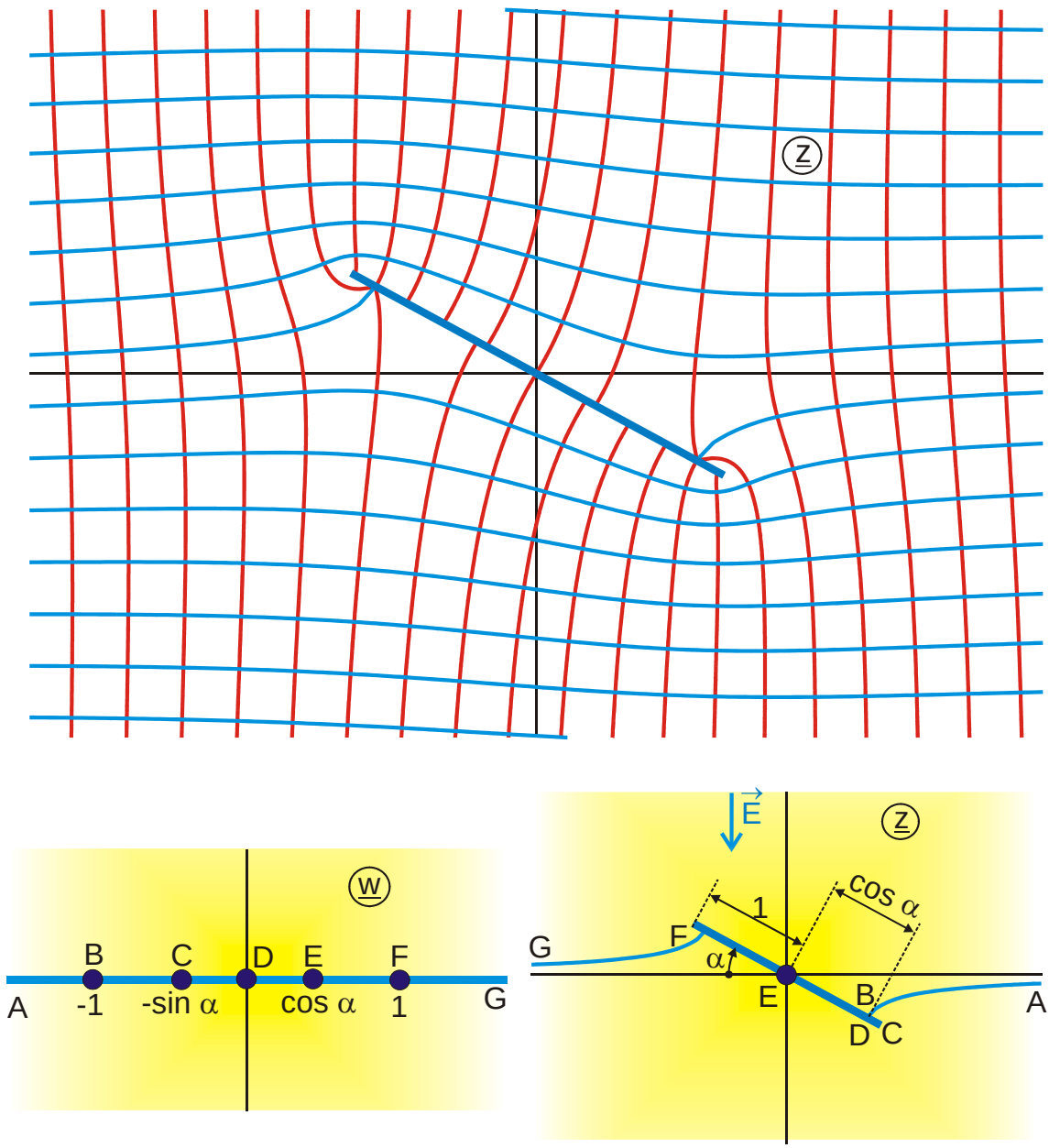


Abbildung R 3

$$z = \left(-w\cos\alpha + \sqrt{1-w^2}\,\sin\alpha\right)\exp(-j\alpha)$$

$-2{,}5 \le u \le 2{,}5$

$0 \le v \le 2{,}5$

$\alpha = 45°$

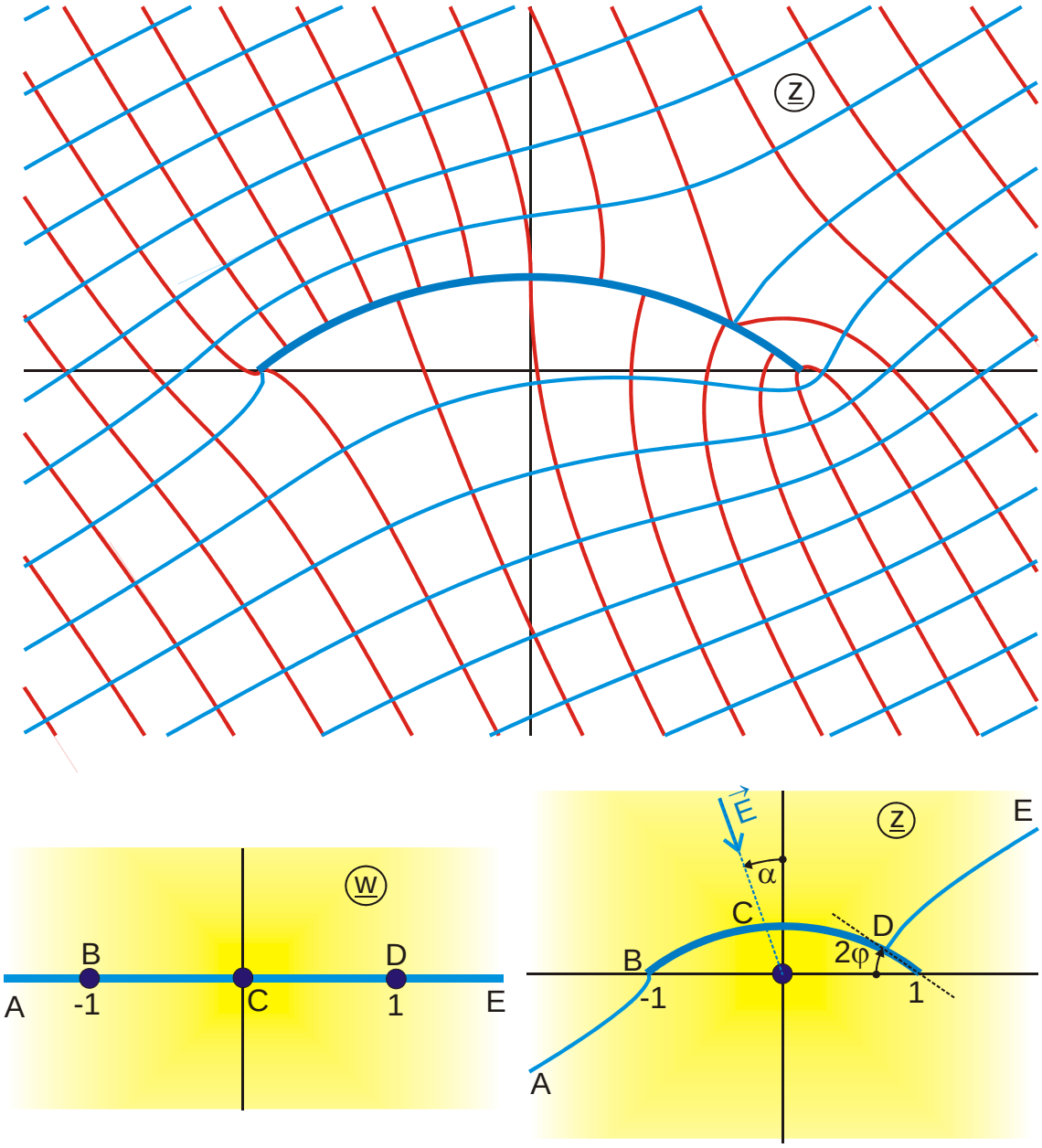


Abbildung R 3.1

$$z = \frac{1}{2}\left(w_2 + 1/w_2\right)$$

$$w_2 = \frac{w_1 + j\sin\varphi}{\cos\varphi}$$

$$w_1 = \left(w \pm \sqrt{w^2 - 1}\right)\exp(j\alpha)$$

$-2{,}5 \le u \le 2{,}5$

$0 \le v \le 2{,}5$

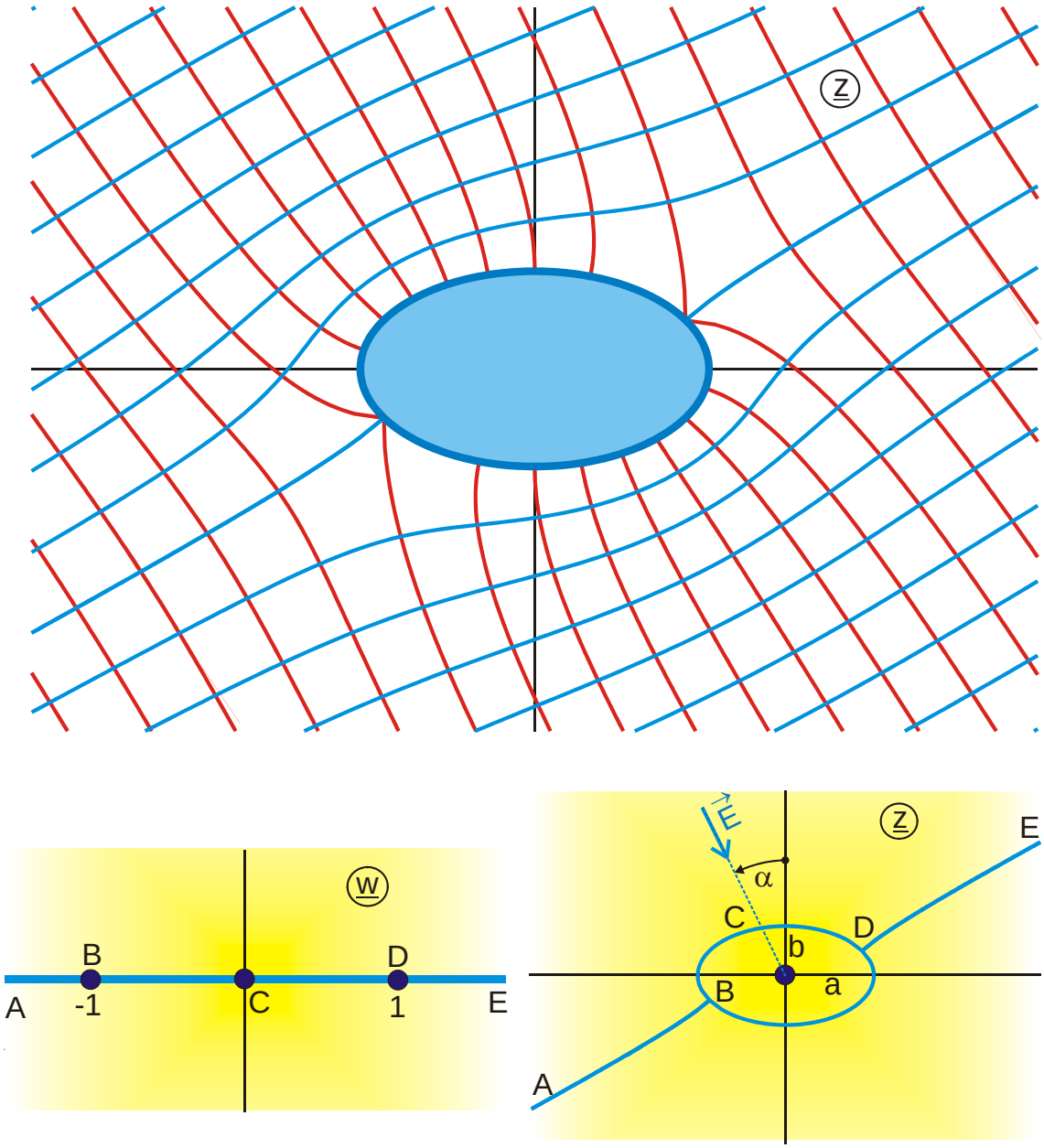


Abbildung R 3.2

$$z = \frac{w_1 + c / w_1}{1 + c}$$

$$w_1 = \left(w + \sqrt{w^2 - 1}\right) \exp(j\alpha)$$

$$c = \frac{1 - b}{1 + b}$$

$-2{,}5 \le u \le 2{,}5$

$0 \le v \le 2{,}5$

gegeben: b, α

$a = 1$

$\alpha = 30°$

$b = 0{,}6$

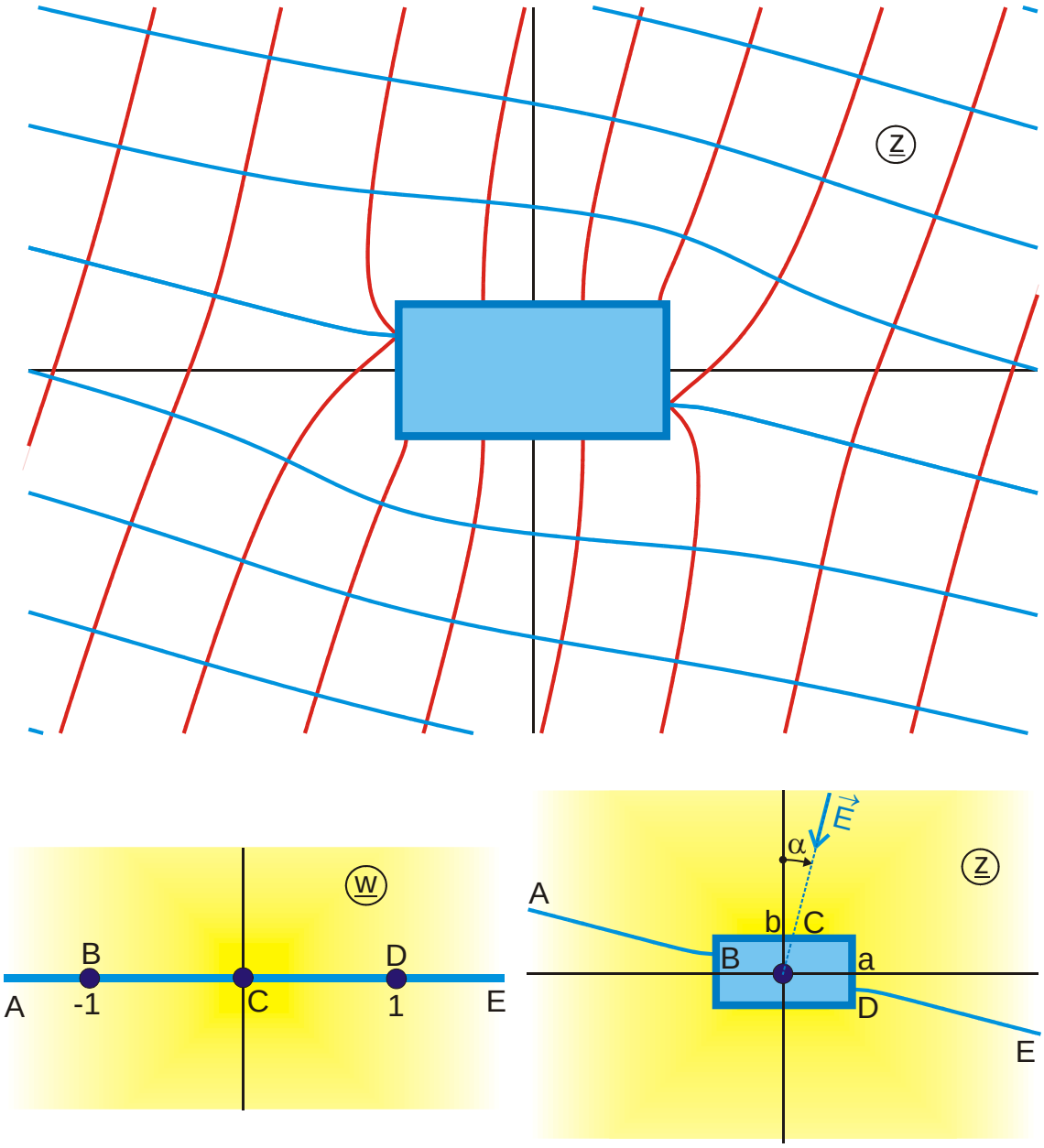


Abbildung R 3.3

$$z = B_a\left(w_1 / k, k\right) + jb$$

$$w_1 = w\cos\alpha \pm \sqrt{1 - w^2}\,\sin\alpha$$

$$b = \frac{E'(k)}{k^2} - K'(k) \qquad a = \frac{E(k) - k'^2\,K(k)}{k^2}$$

$$\alpha = 15° \qquad k = 0{,}8$$

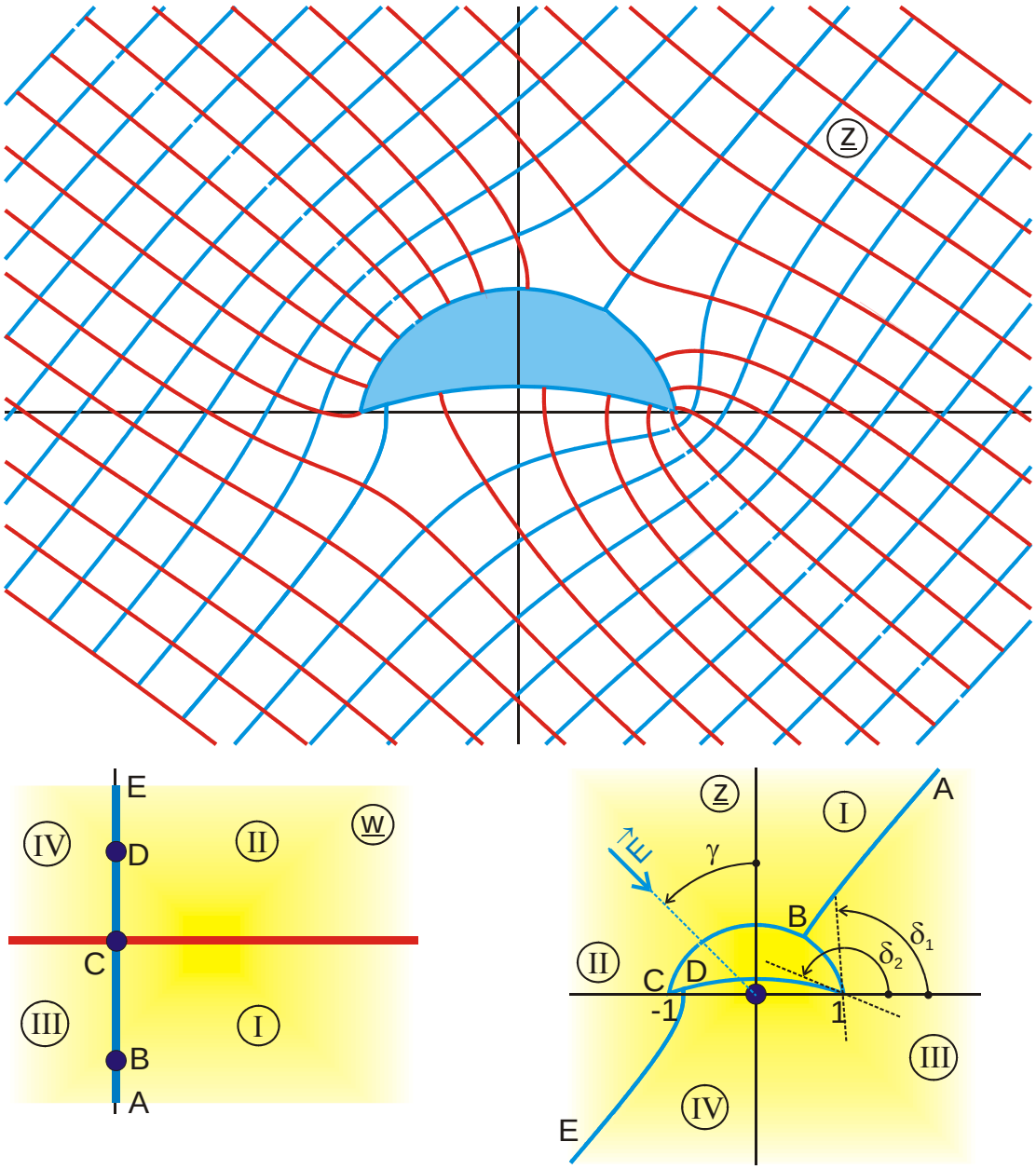


Abbildung R 3.4

$$z = \frac{1 + w_3}{1 - w_3}$$

$$w_3 = e^{j\delta_2}\ w_2^{(2-\delta_2/\pi+\delta_1/\pi)}$$

$$w_2 = a + jbw_1$$

$$w_1 = \frac{\sin\varphi + \sqrt{w^2 + j2w\cos\varphi + \sin^2\varphi}}{w}$$

$$\alpha = \frac{2\pi - \delta_2}{2 - \delta_2/\pi + \delta_1/\pi}$$

$-2{,}5 \le u \le 2{,}5$

$-3{,}5 \le v \le 1{,}5$

gegeben: φ, δ_1, δ_2

γ = Einfallswinkel (E) = f(φ, δ_1, δ_2)

$a = \cos\varphi$

$b = \sin\varphi$

γ einstellbar mit φ

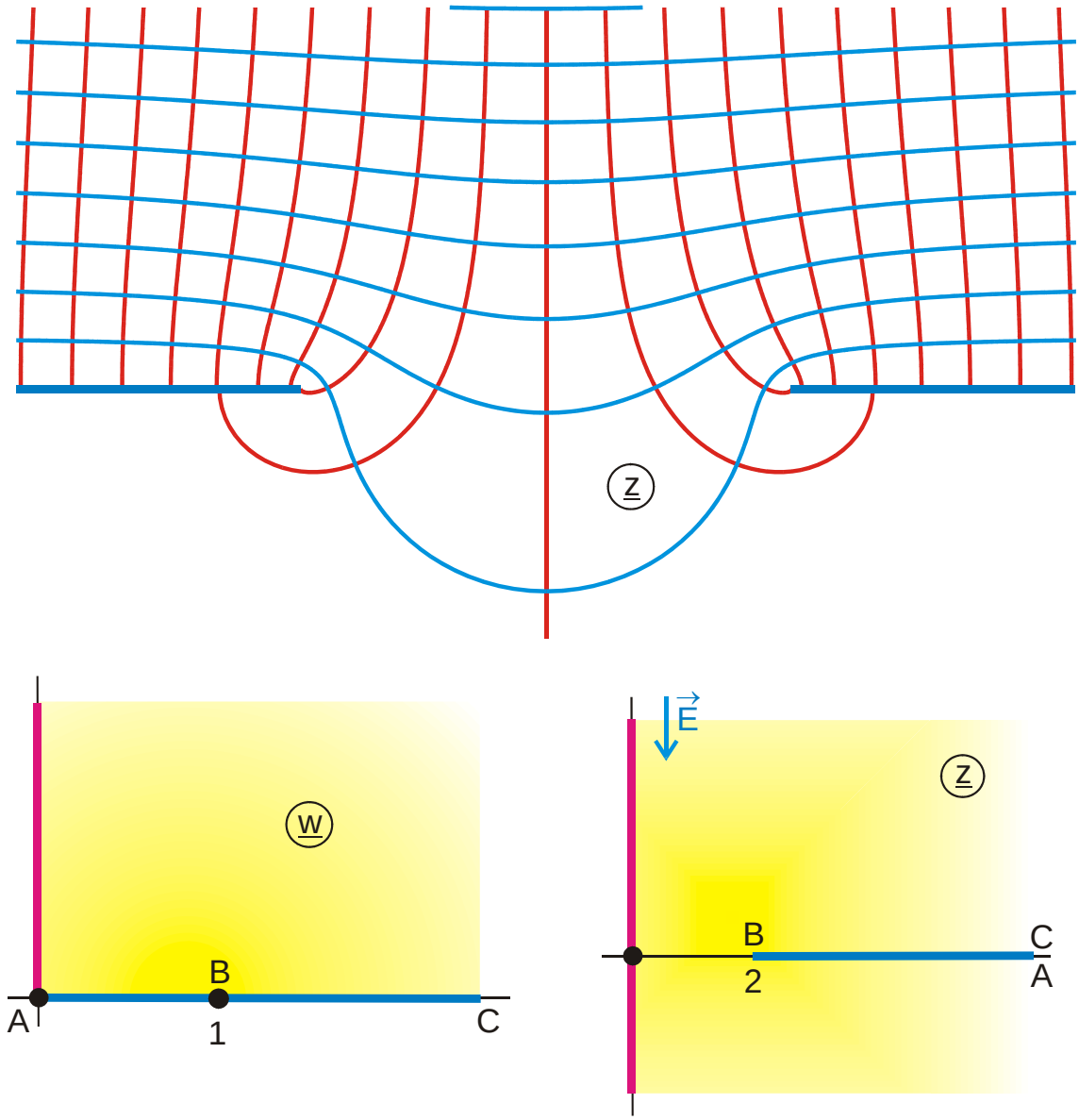


Abbildung R 4

$z = w + 1/w$

$0 \le u \le 4{,}5$ $\qquad$ $0 \le v \le 4{,}5$

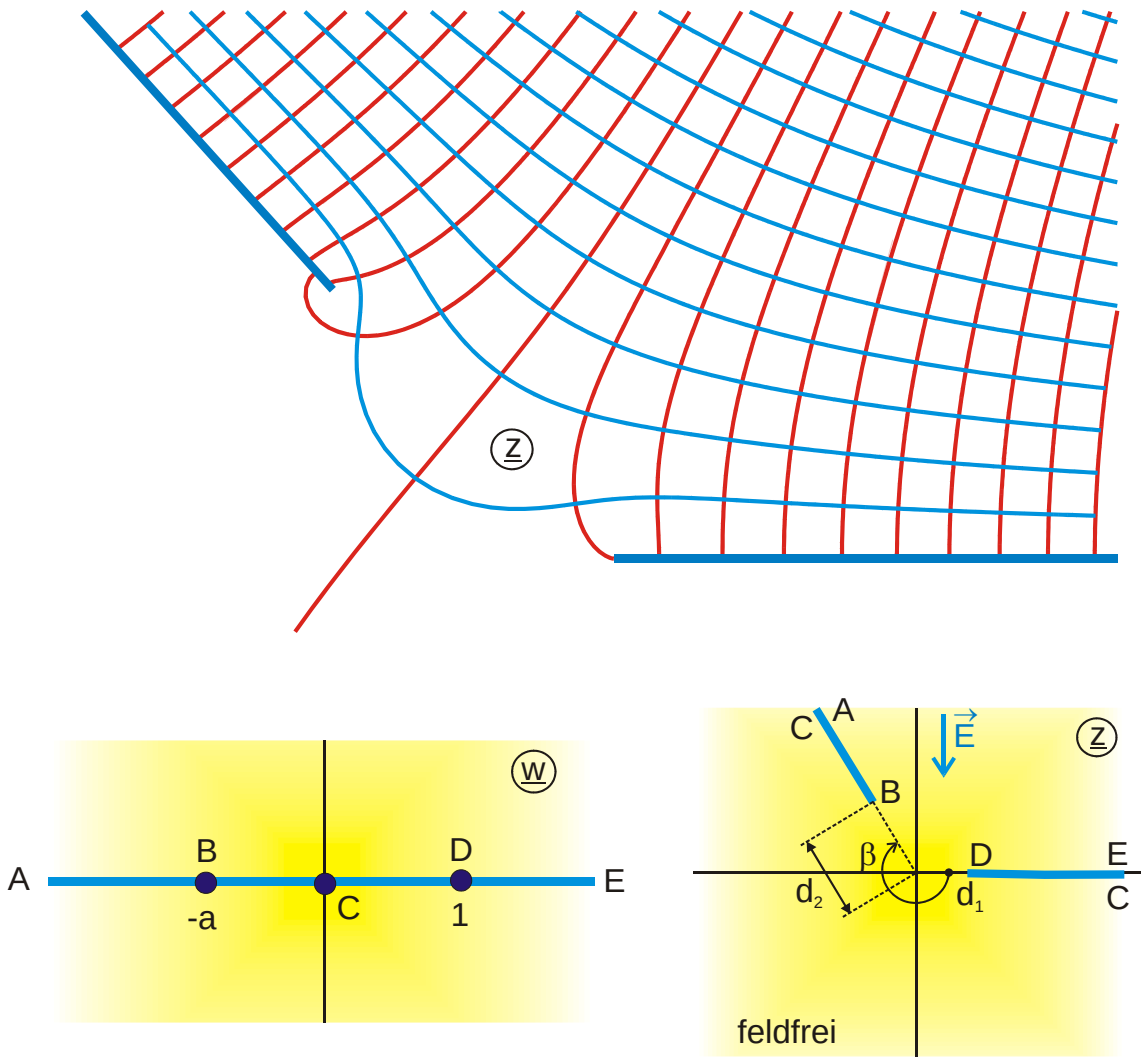


Abbildung R 4.1

$$z = \frac{\frac{a}{b} - \frac{1-a}{1-b} w + \frac{w^2}{2-b}}{w^b}$$

$$d_1 = \frac{1}{2-b} + \frac{a-b}{b(1-b)}$$

$$d_2 = \frac{\frac{a}{b} - \frac{a^2}{2-b}}{a^b (1-b)}$$

$b = \beta/\pi$

$-10 \le u \le 10$

$0 \le v \le 15$

$a = 1{,}6$

$\beta = 230°$

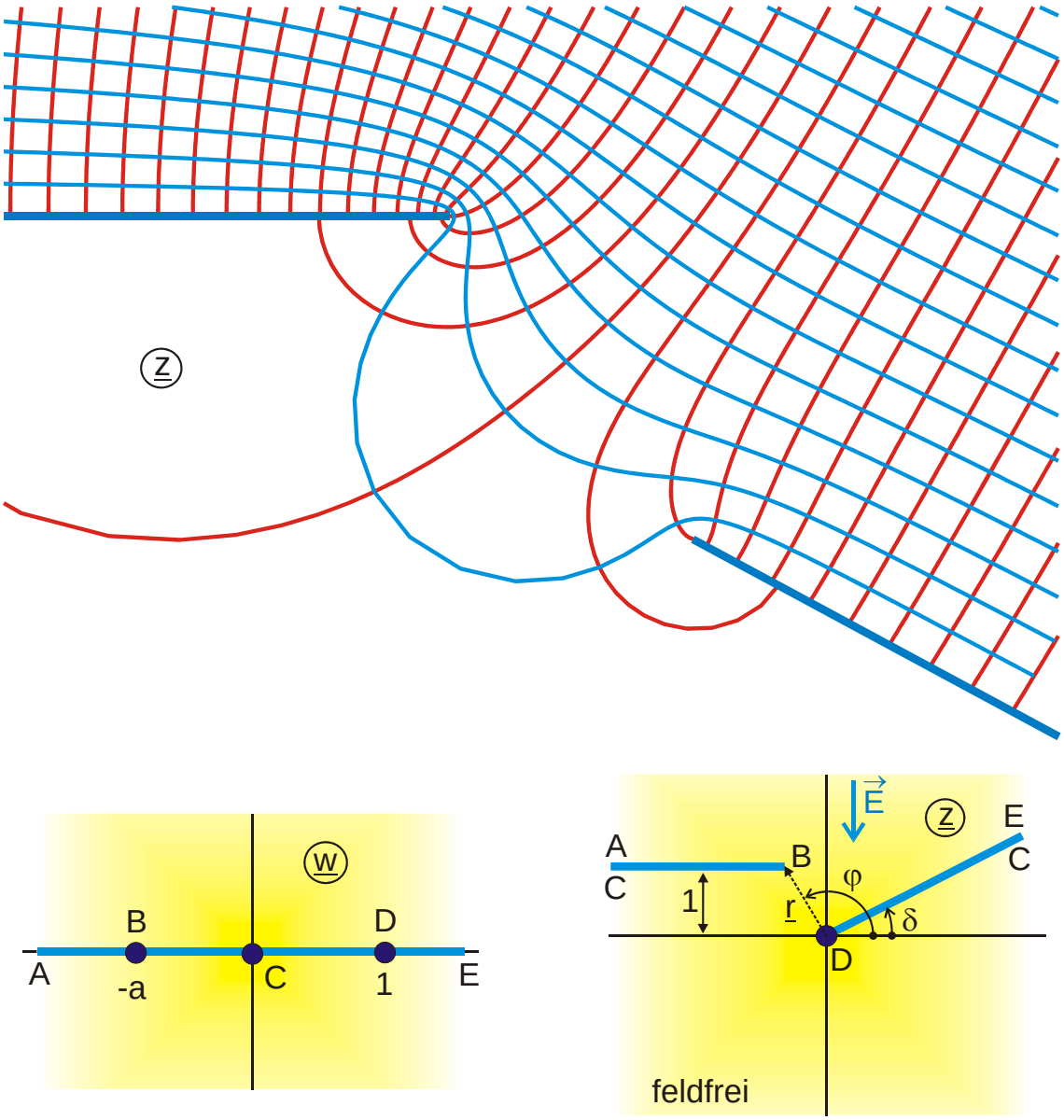


Abbildung R 4.2

$$z = \frac{\exp[j\pi(1+t)]}{\sin(\pi t)}\left\{\frac{1}{w^{1+t}}\frac{w^2t(1+t)+w(1+a)(1-t^2)-at(1-t)}{1+t+a(1-t)}-1\right\}$$

gegeben: a, δ

$t = \delta/\pi$ $\qquad a < 0$

$$\underline{r} = \frac{\exp[j\pi(1+t)]}{\sin(\pi t)}\left\{\frac{1}{a^t}\frac{1-t+a(1+t)}{1+t+a(1-a)}-1\right\} = r\,e^{j\varphi}$$

$-12 \le u \le 6$ $\qquad 0 \le v \le 8$

$a = -2{,}5$ $\qquad \delta = -30°$

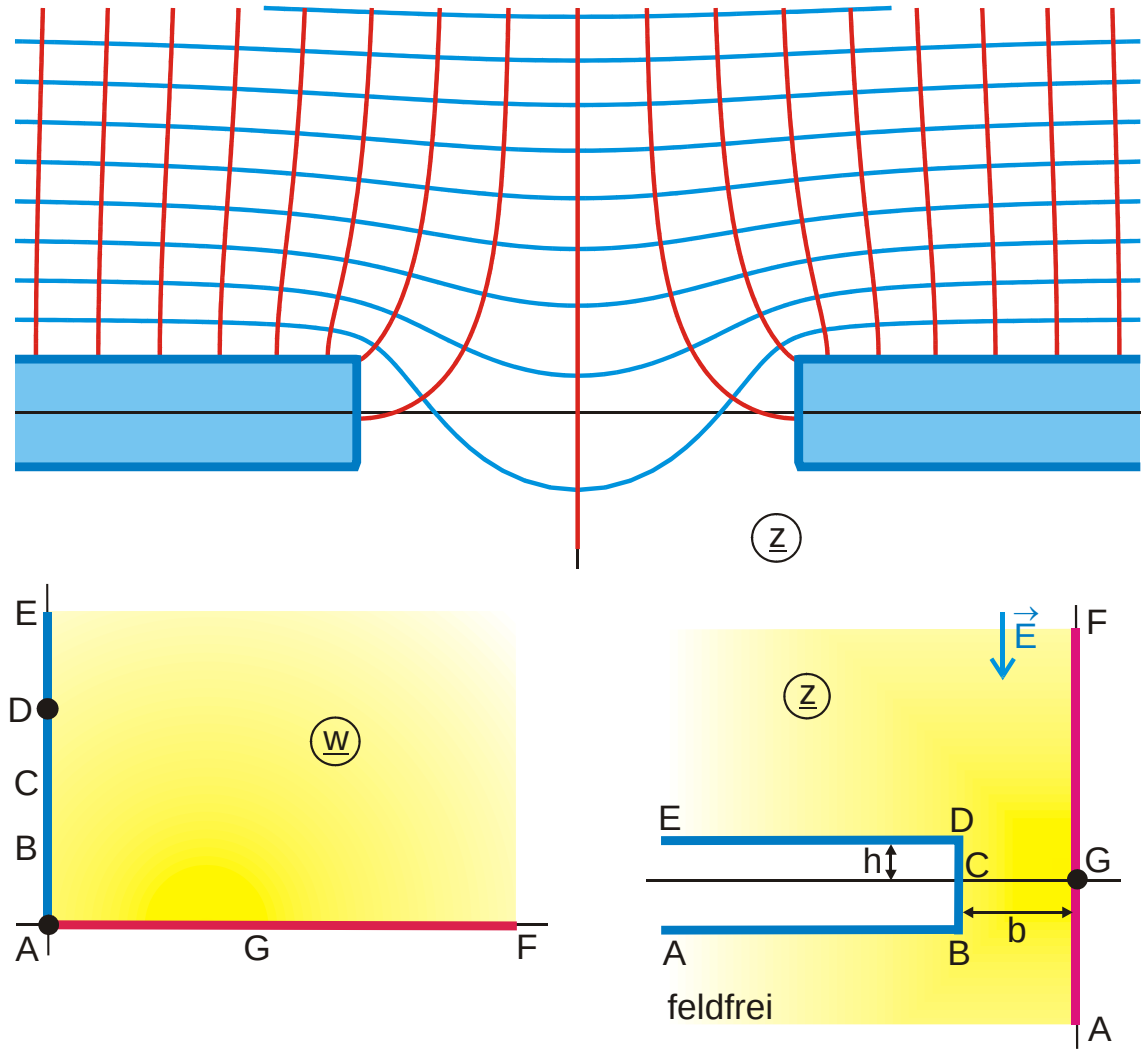


Abbildung R 4.3

$z = E_t(w_1, k)$

$w_1 = j \ln(w\pi)$

$b = E(k)$ $h = K'(k) - E'(k)$

gegeben: k

$v_D = \frac{1}{\pi} \exp[\operatorname{ar\,cosh}(1/k)]$

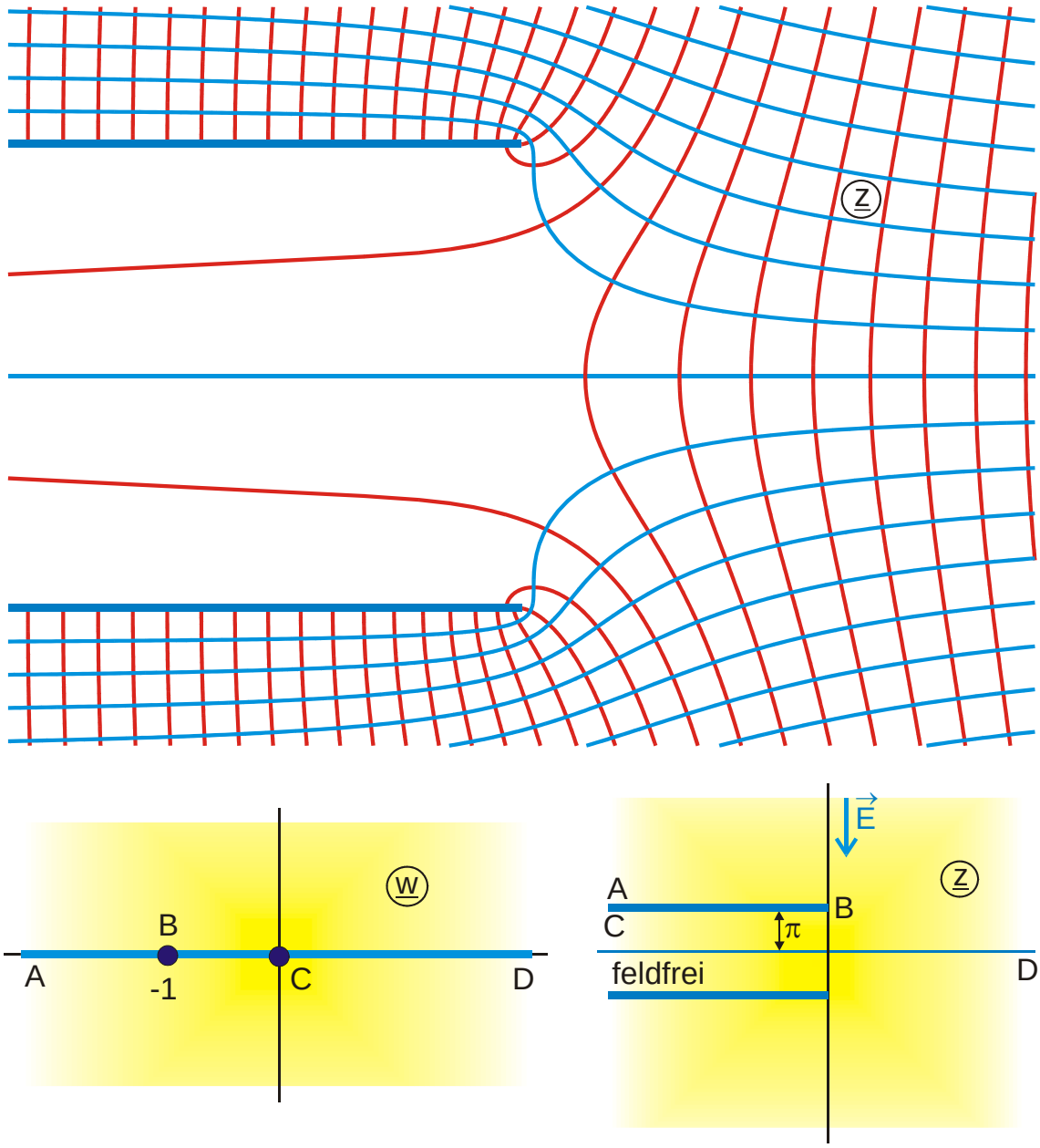


Abbildung R 4.4

$z = 1 + w + \ln w$

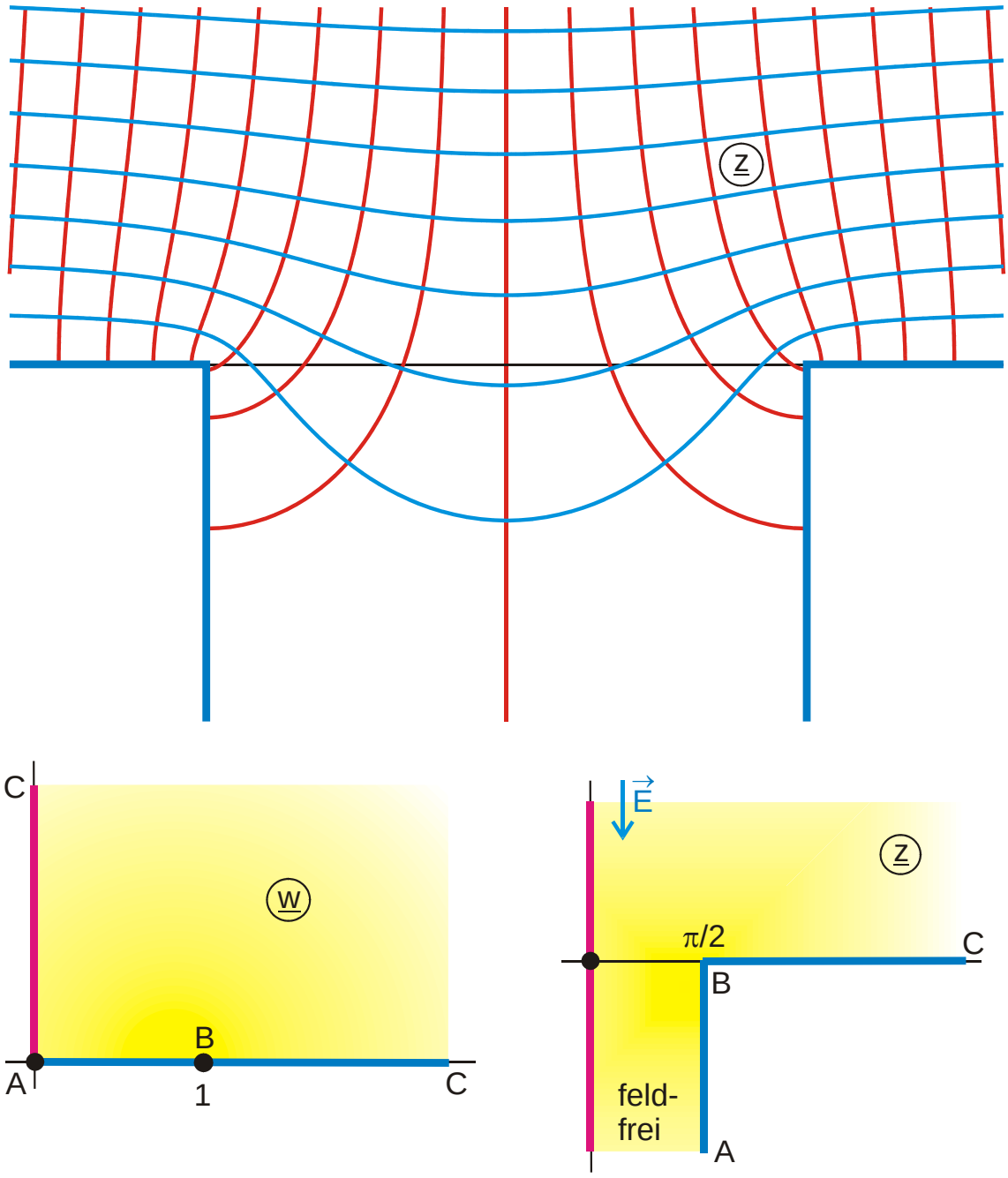


Abbildung R 4.5

$$z = j\left(w_1 + \frac{1}{2} \ln \frac{w_1 - 1}{w_1 + 1} \right)$$

$$w_1 = \sqrt{1 - w^2}$$

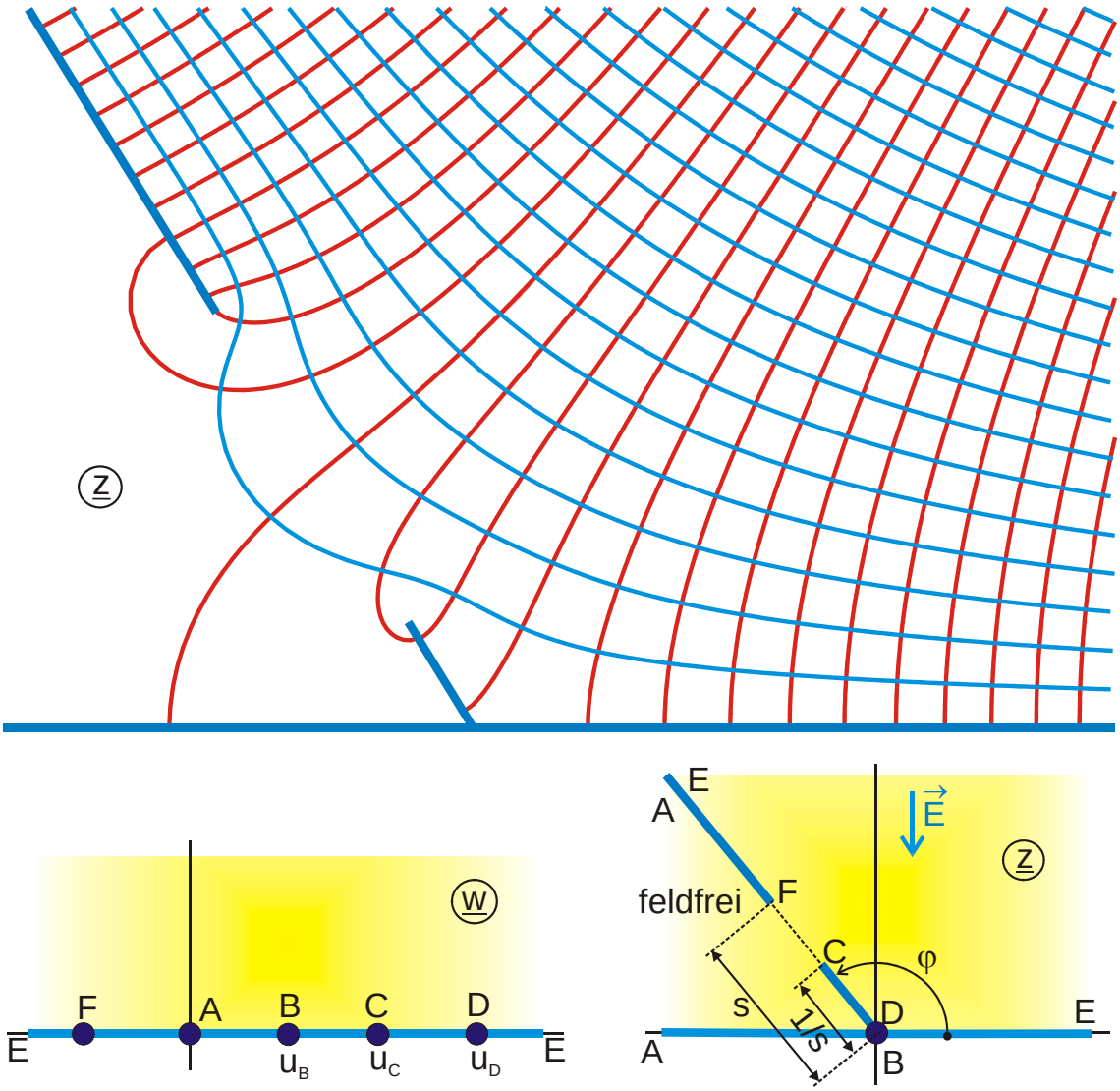


Abbildung R 4.6

$$z = \left(\frac{w_1 + a}{w_1 - a}\right)^{f} \left(\frac{w_1 + 1/a}{w_1 - 1/a}\right)^{f \cdot b}$$

$$w_1 = \frac{w/a - a}{w - 1}$$

$f = 1\text{-}\varphi/\pi$

$b = \varphi/(\pi\text{-}\varphi)$

gegeben: φ, a

$$s = \exp\left[2f\left\{\operatorname{ar\,tanh}(a/p) + b\,\operatorname{ar\,tanh}(ap)\right\}\right]$$

$$p = \sqrt{\frac{1 + a^2 b}{a^2 + b}}$$

$$u_B = \frac{2}{1 + 1/a^2}$$

$$u_C = \frac{p + a}{p + 1/a}$$

$$u_D = \frac{a^2 + 1}{2}$$

$-2 \le u \le 4$

$0 \le v \le 3$

$a = 0{,}35$

$\varphi = 120°$

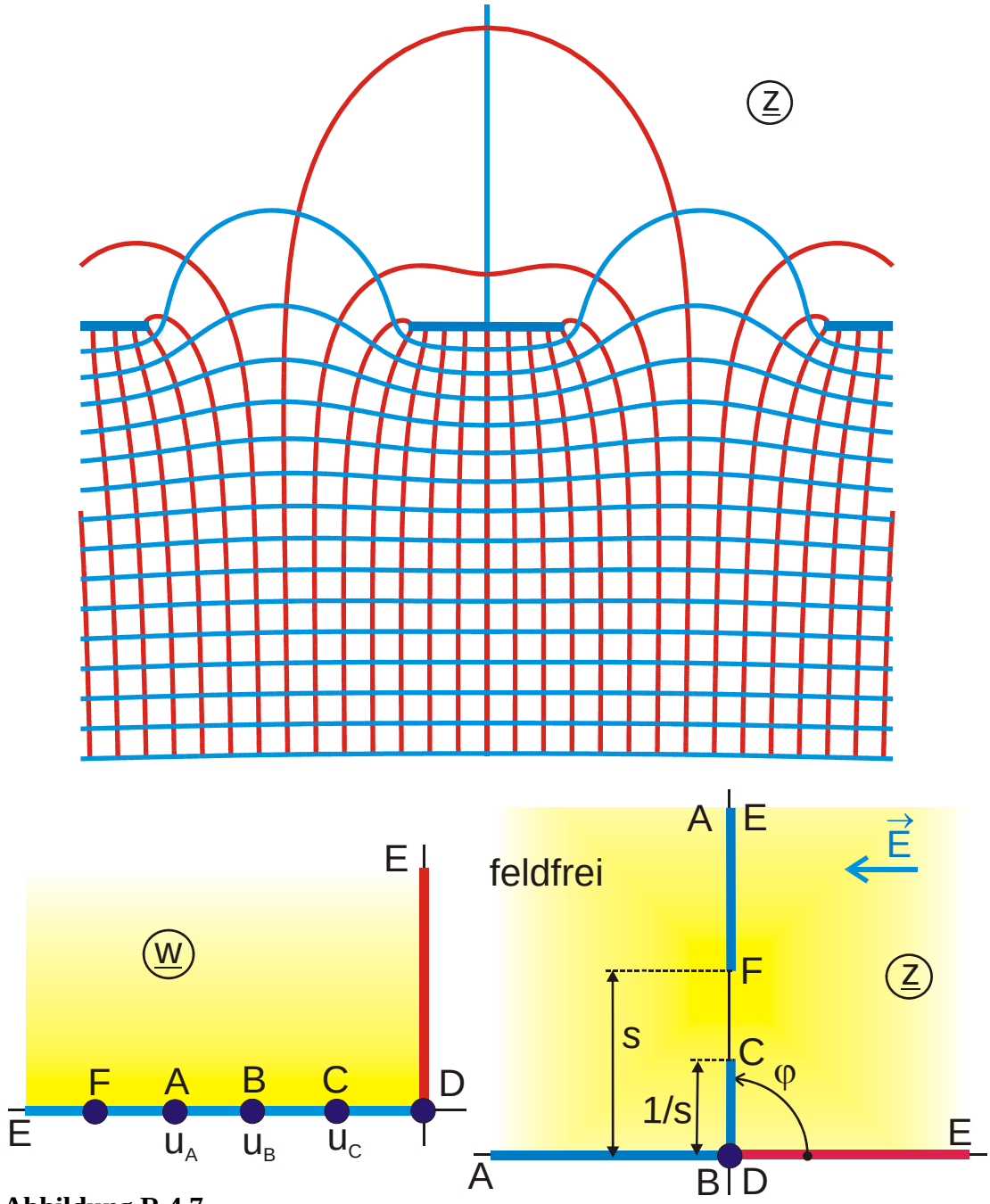


Abbildung R 4.7

$$z = \left(\frac{w_2 + a}{w_2 - a}\right)^f \left(\frac{w_2 + 1/a}{w_2 - 1/a}\right)^{f \cdot b}$$

$$w_2 = \frac{w_1/a - a}{w_1 - 1}$$

$w_1 = u_D - w^2$ $\qquad$ $f = 1\text{-}\varphi/\pi$ $\qquad$ $b = \varphi/(\pi\text{-}\varphi)$

$$s = \exp\left[2f\left\{\text{ar tanh}(a/p) + b\ \text{ar tanh}(ap)\right\}\right]$$

$$p = \sqrt{\frac{1 + a^2 b}{a^2 + b}}$$

$$u_B = \sqrt{u_D - \frac{2}{1 + 1/a^2}}$$

$$u_C = \sqrt{u_D - \frac{p + a}{p + 1/a}}$$

$u_A = \sqrt{u_D}$ $\qquad$ gegeben: φ, a $\qquad$ $u_D = (a^2 + 1)/2$

$-2 \le u \le 0$ $\qquad$ $0 \le v \le 2$

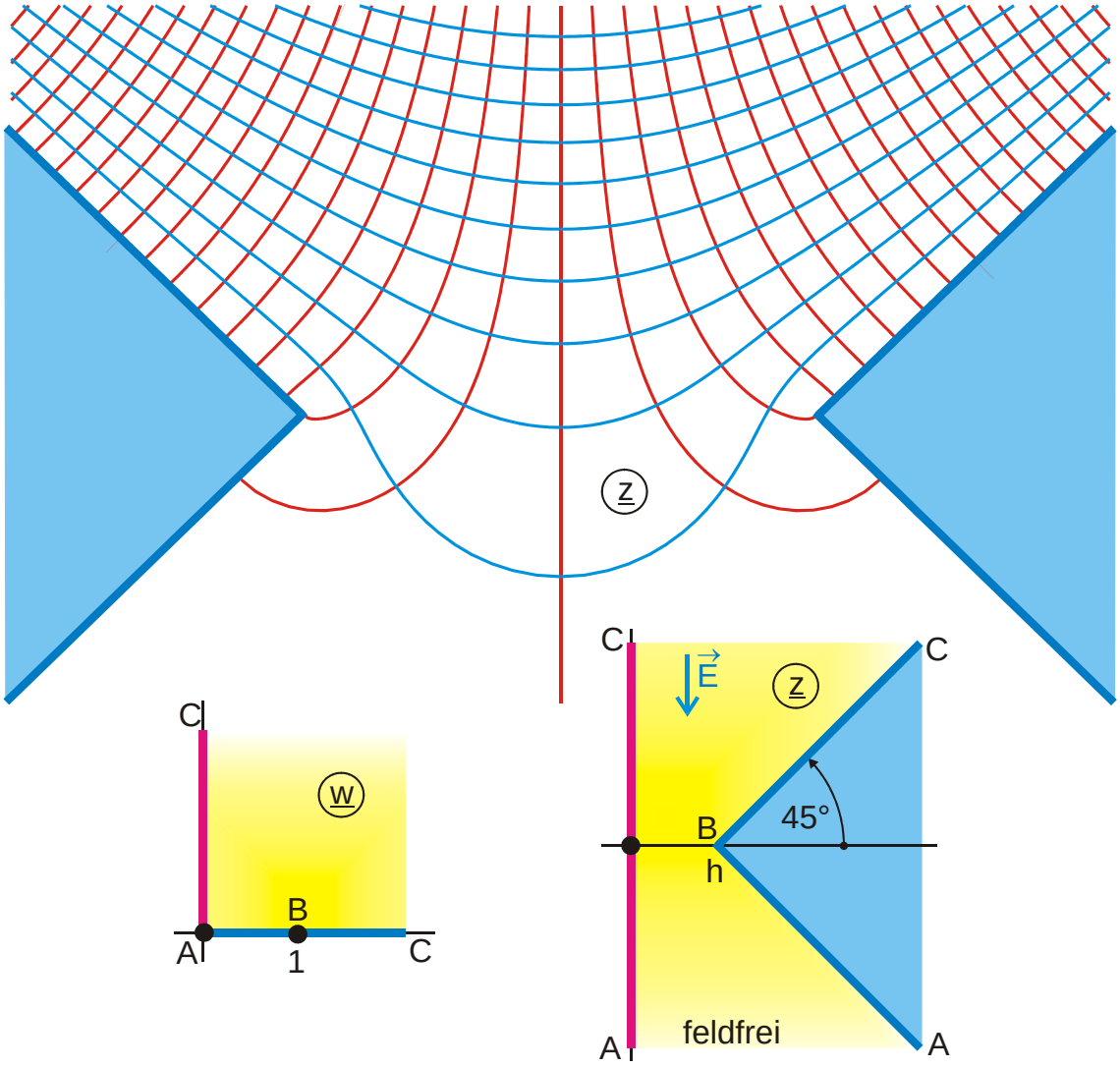


Abbildung R 4.8

$$z = \exp\left(j\frac{\pi}{4}\right)\left\{B_a(w_1,k) - jB_a(w_2,k)\right\}$$

$$w_1 = \sqrt{1+w} \qquad w_2 = \sqrt{1+\frac{1}{w}}$$

$$k = 1/\sqrt{2} \qquad h = \sqrt{2}\left[2E(k) - K(k)\right]$$

$$0 \le u \le 10 \qquad 0 \le v \le 10$$

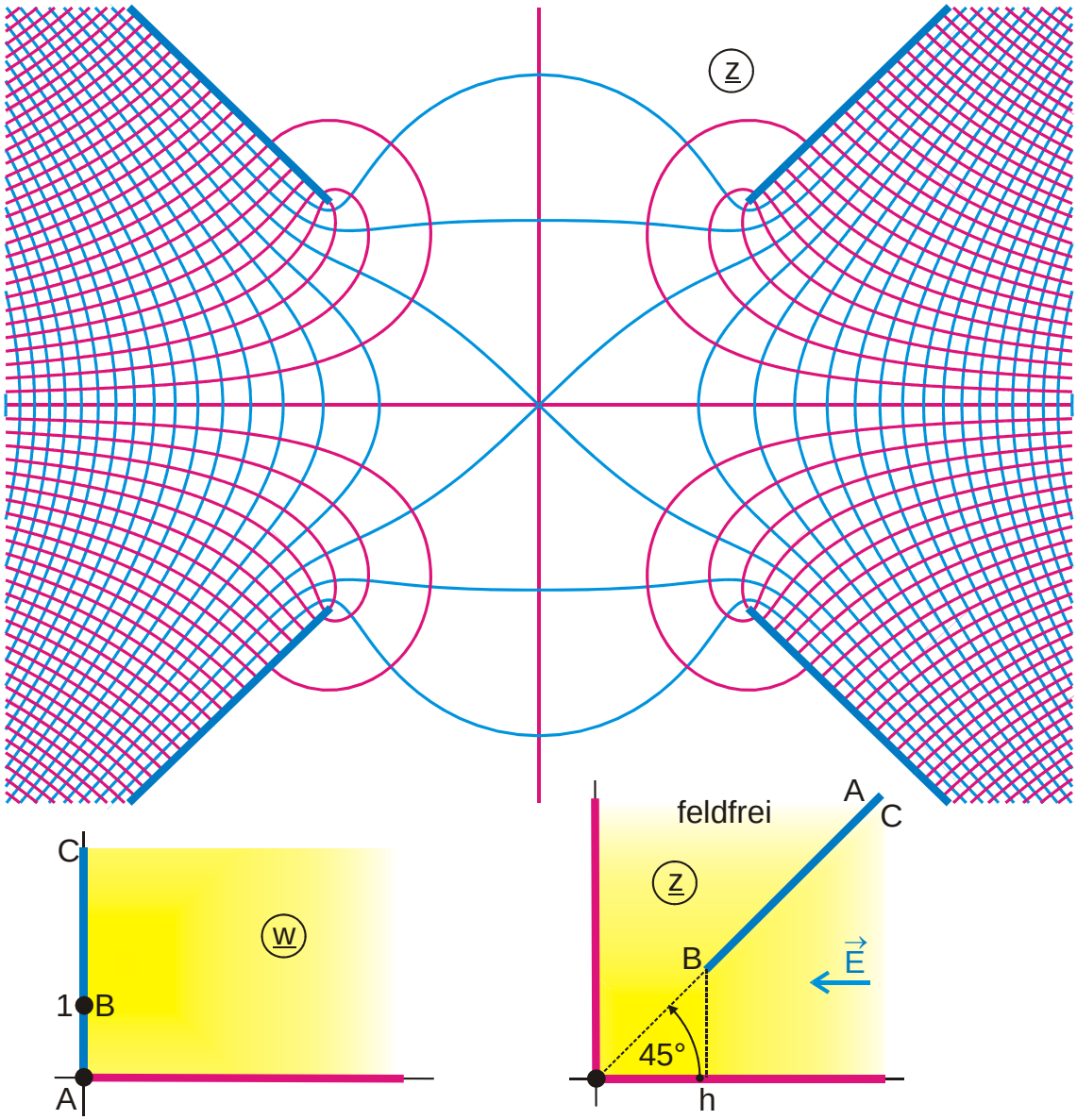


Abbildung R 4.9

$$z = B_a(w_1, k) + jB_a(w_2, k) - h(1 + j)$$

$$w_1 = \sqrt{1 + w} \qquad w_2 = \sqrt{1 + \frac{1}{w}}$$

$$k = 1/\sqrt{2} \qquad h = 2E(k) - K(k)$$

$$0 \le u \le 10 \qquad 0 \le v \le 10$$

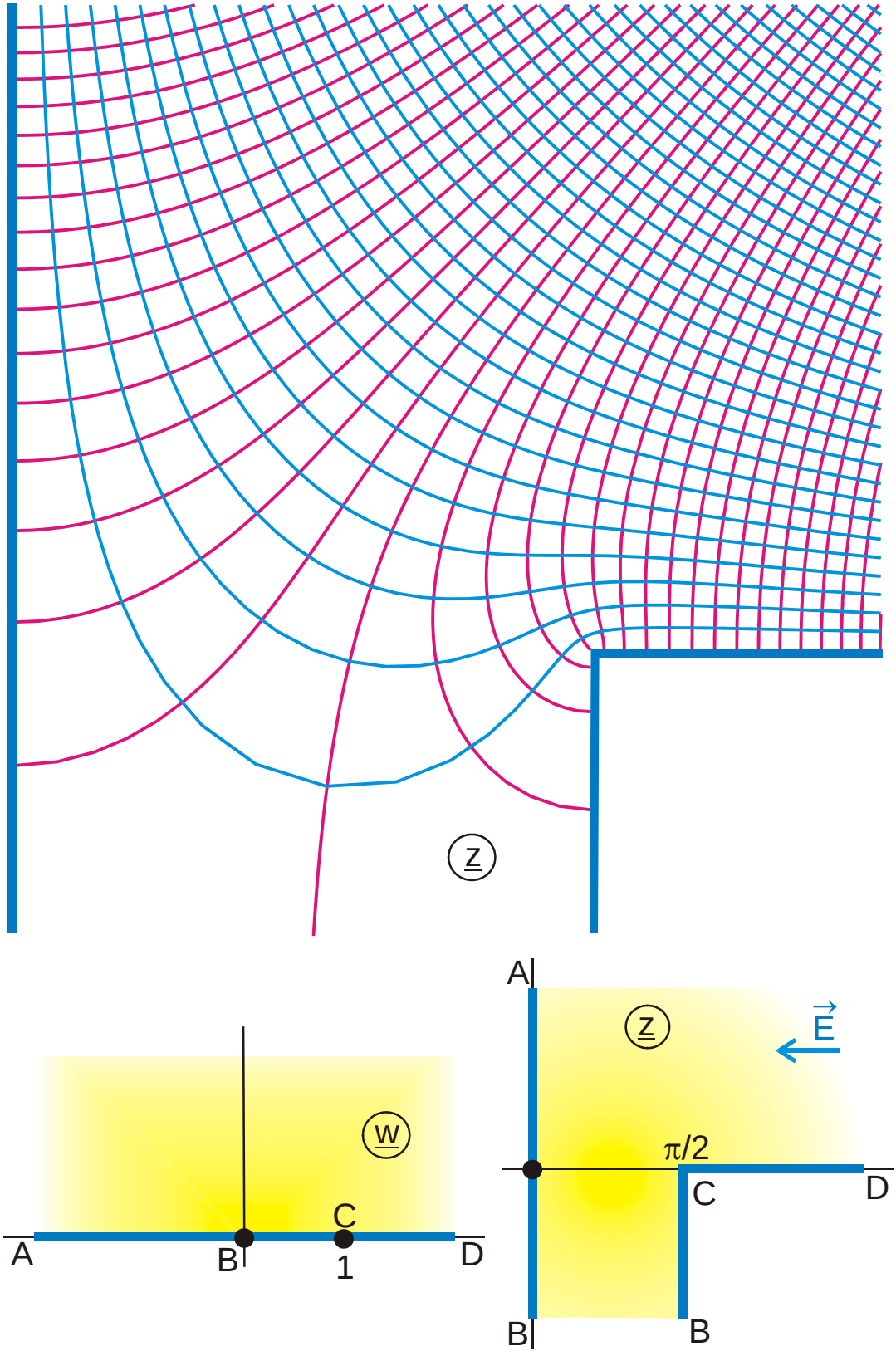


Abbildung R 4.10

$$z = \sqrt{w-1} - \arctan\sqrt{w-1} + \pi/2$$

$-10 \le u \le 10$ $\qquad$ $0 \le v \le 10$

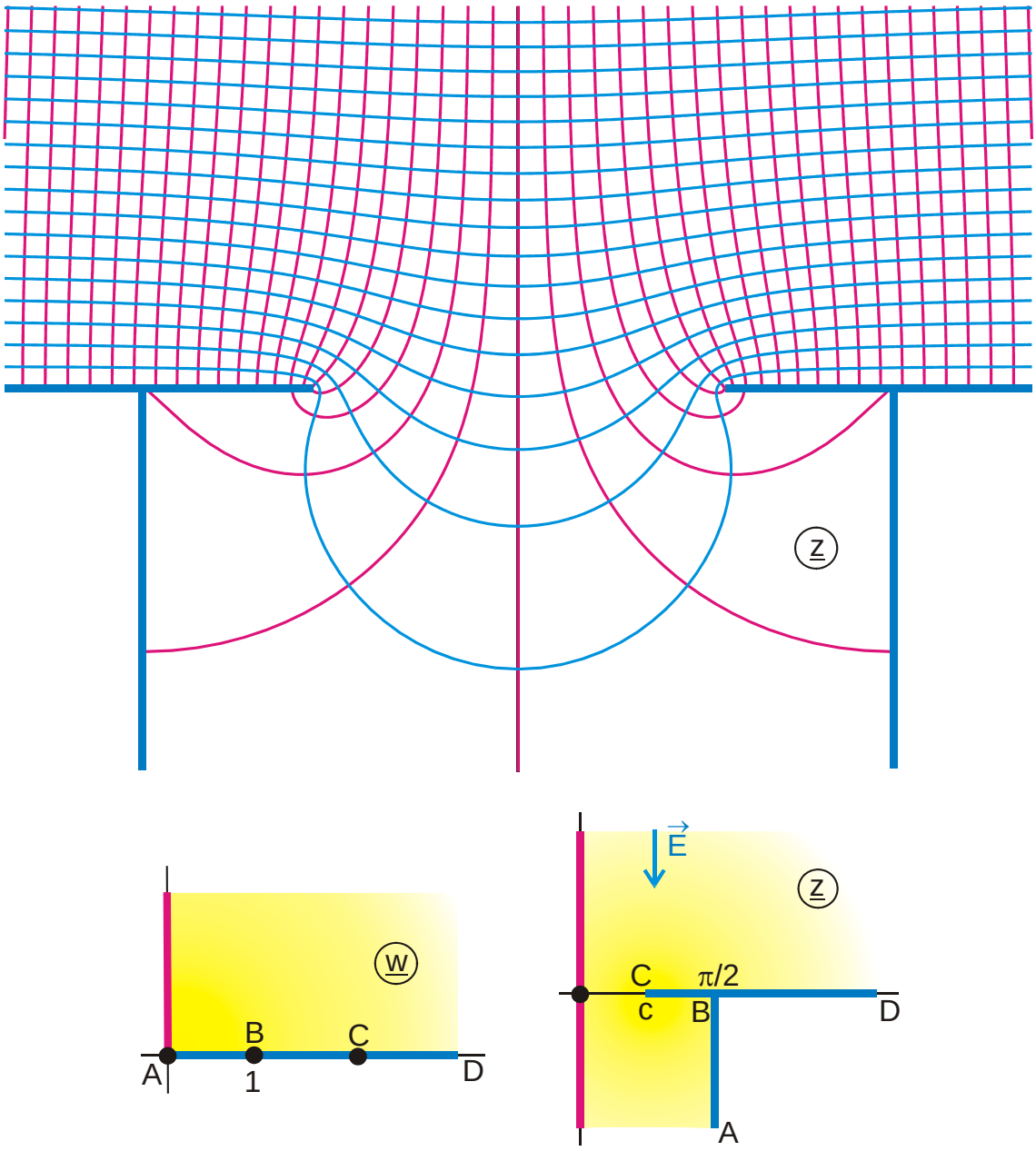


Abbildung R 4.11

$$z = j\left(bw_1 + \frac{1}{2} \ln \frac{w_1 - 1}{w_1 + 1} \right)$$

$$w_1 = \sqrt{1 - w^2}$$

gegeben: $b < 1$ $\qquad$ $c = \pi/2$ für $b = 1$

$0 \le u \le 12$ $\qquad$ $0 \le v \le 12$

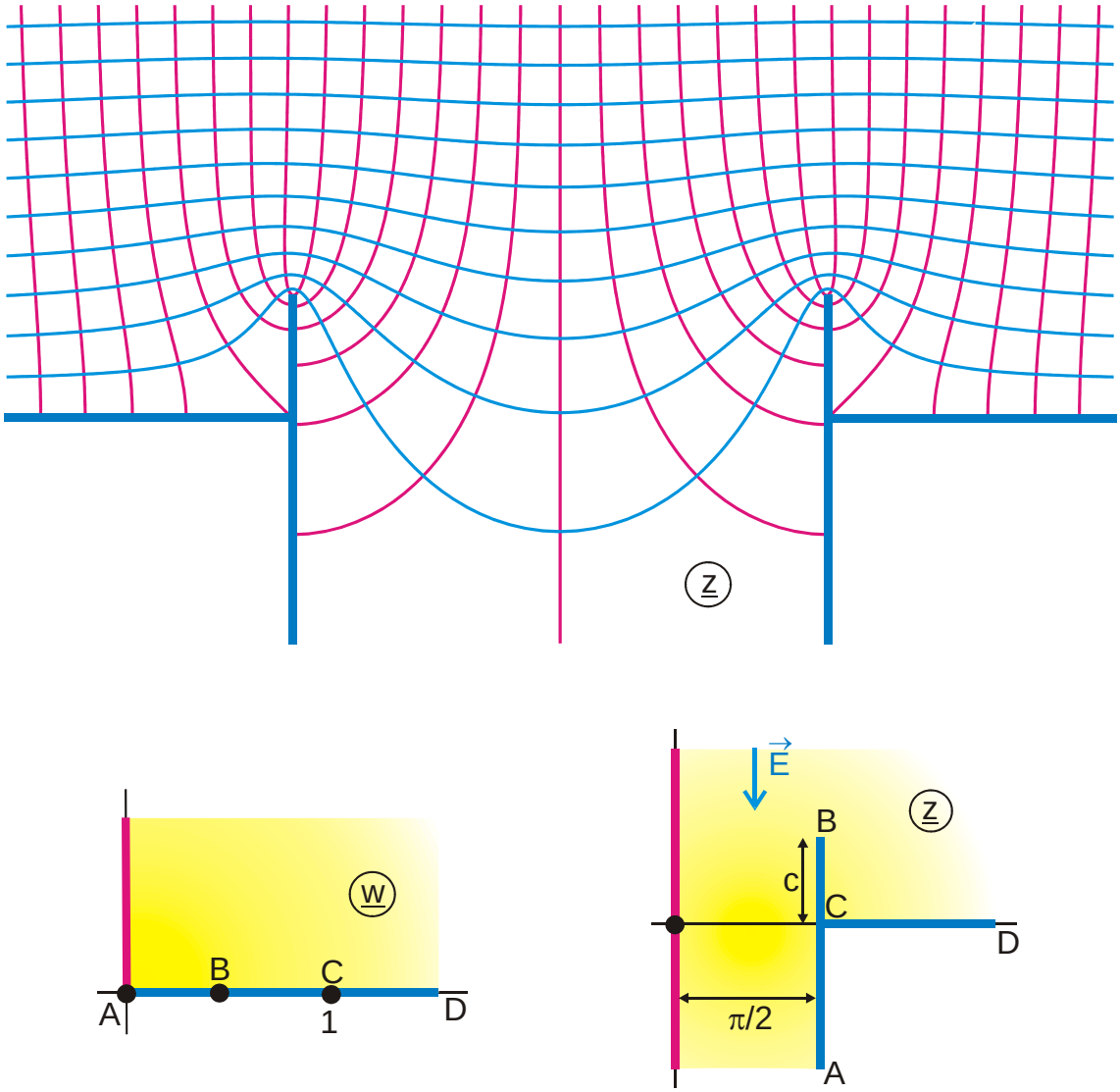


Abbildung R 4.12

$$z = j\left(bw_1 + \frac{1}{2}\ln\frac{w_1 - 1}{w_1 + 1} \right)$$

$$w_1 = \sqrt{1 - w^2}$$

gegeben: $b > 1$ $\qquad$ $c = 0$ für $b = 1$

$0 \le u \le 1.5$ $\qquad$ $0 \le v \le 1.5$

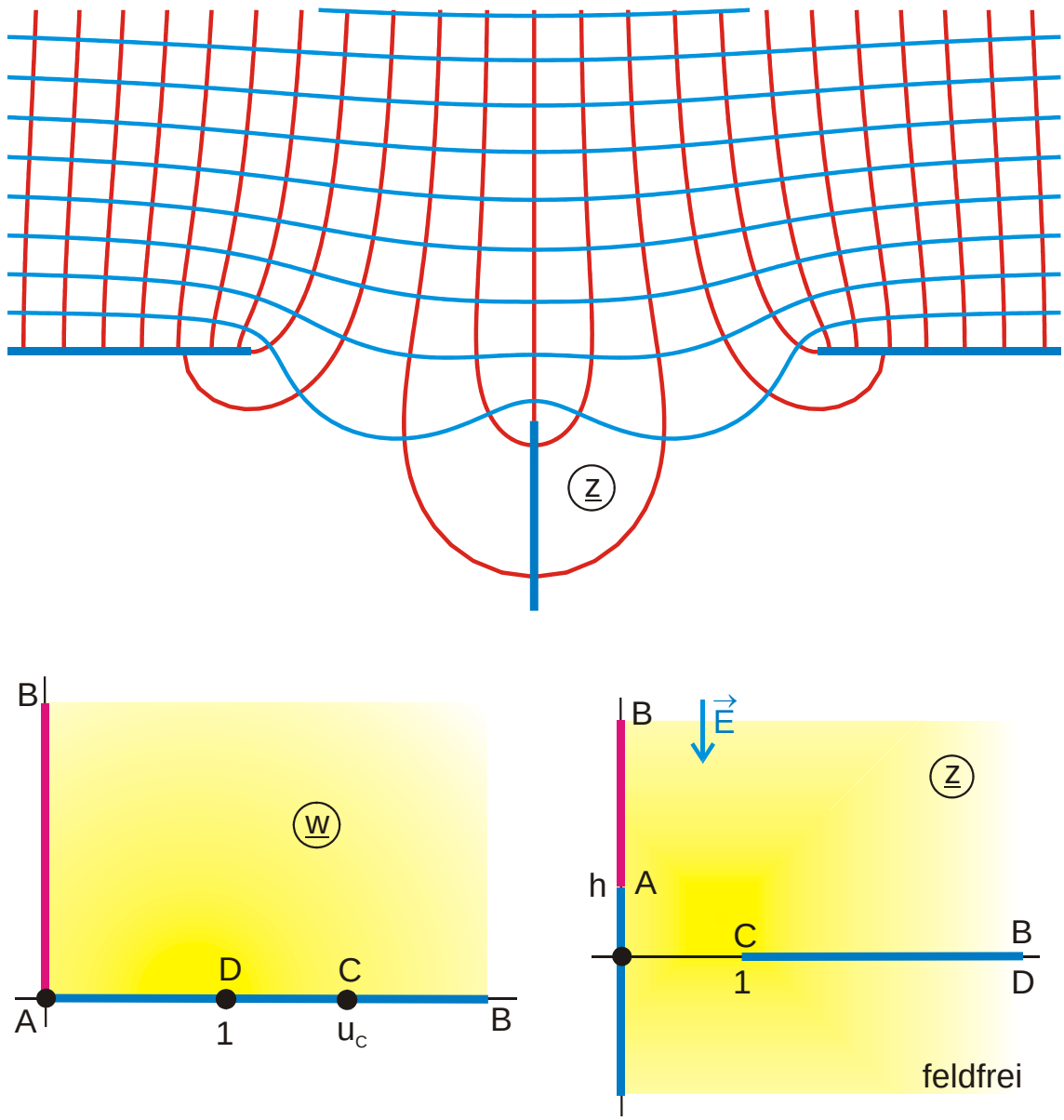


Abbildung R 5

$z = \sin w_2$

$w_2 = j\,(w_1 + a)/2$ $\qquad$ $w_1 = \ln(1 - w^2)$

gegeben: h

$u_C = \sqrt{1 + \exp(-a)}$ $\qquad$ $a = \arcsin h$

$0 \le u \le 6$ $\qquad$ $0 \le v \le 4$

$h = -0{,}5$

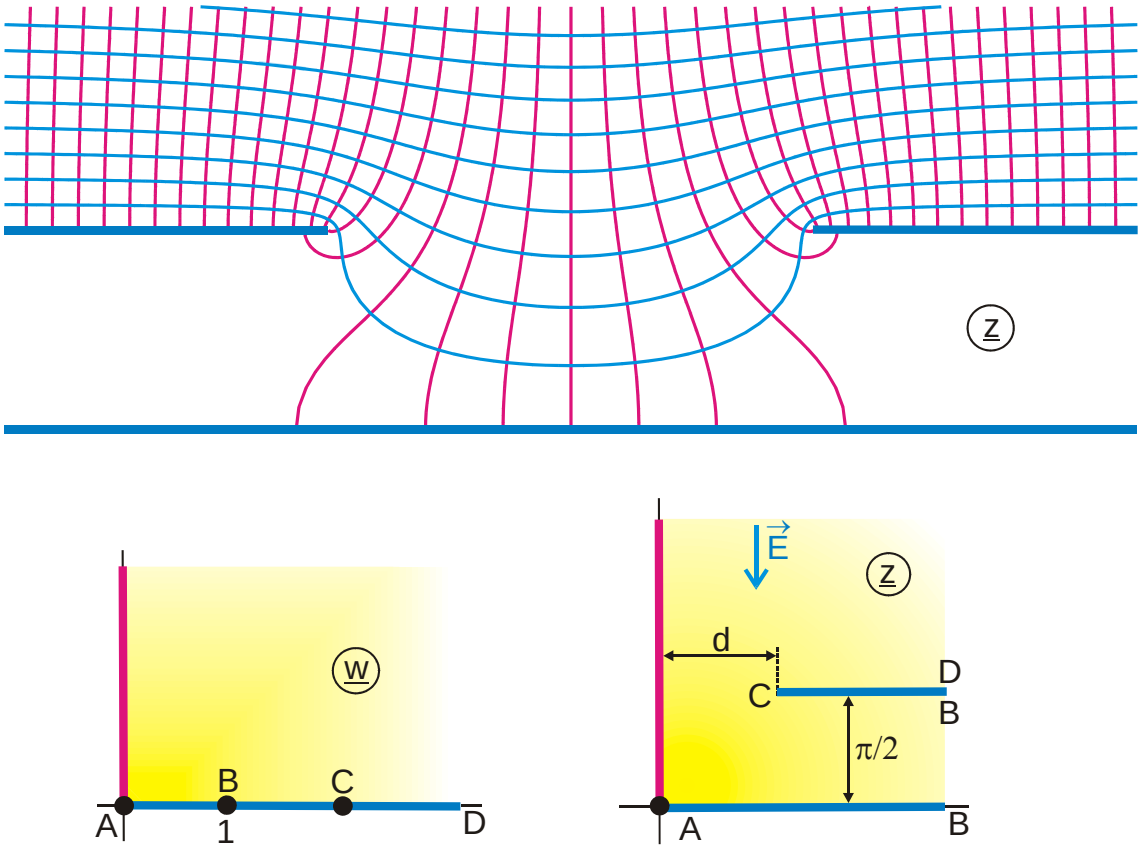


Abbildung R 5.1

$z = bw + \operatorname{ar}\tanh w$

gegeben: b

$0 \le u \le 6$ $0 \le v \le 6$

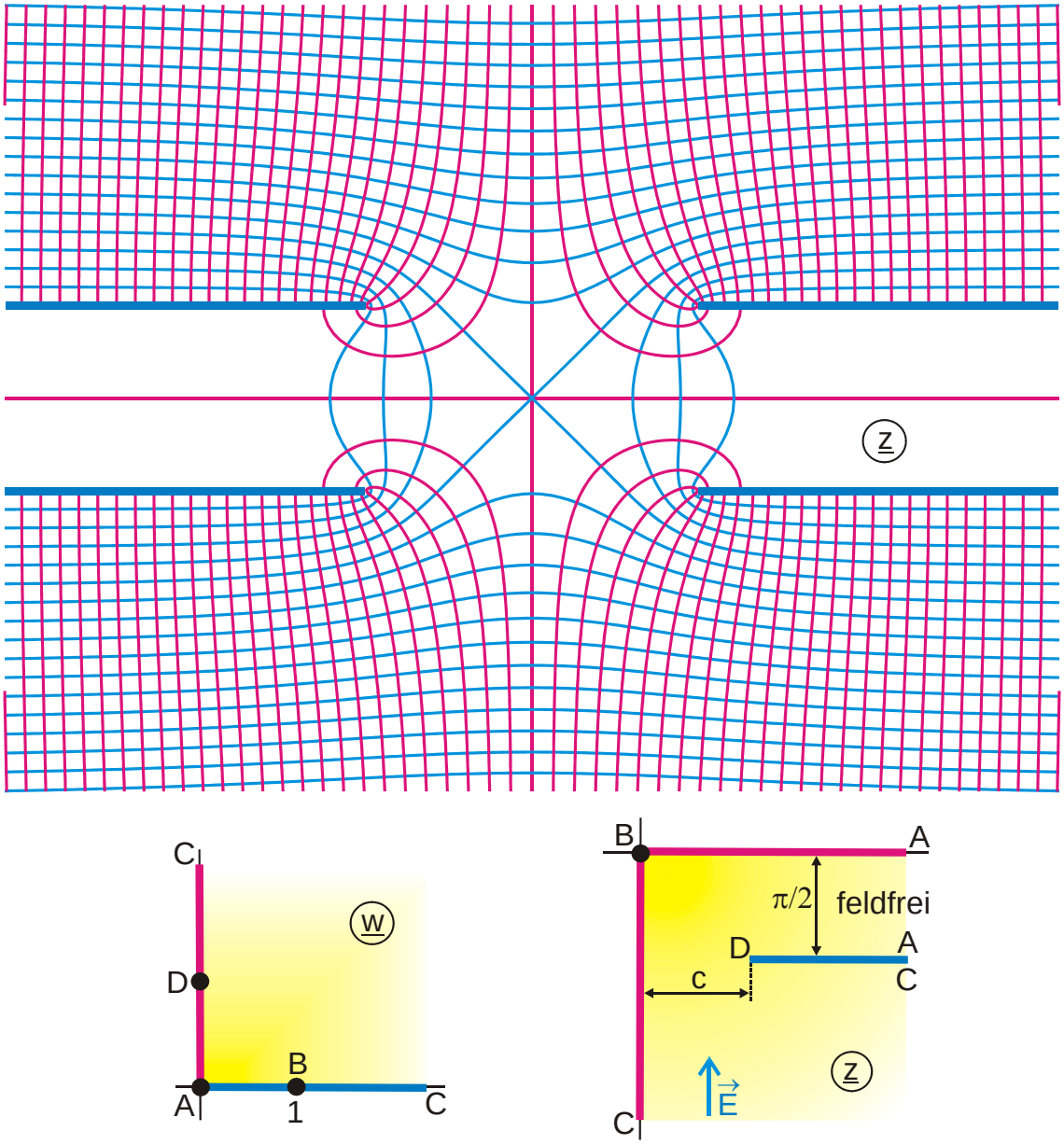


Abbildung R 5.2

$$z = bw_1 - \frac{1}{2}\ln\frac{w_1 - 1}{w_1 + 1} - j\frac{\pi}{2}$$

$$w_1 = \sqrt{1 - w^2}$$

gegeben: b

$0 \le u \le 8$ $0 \le v \le 8$

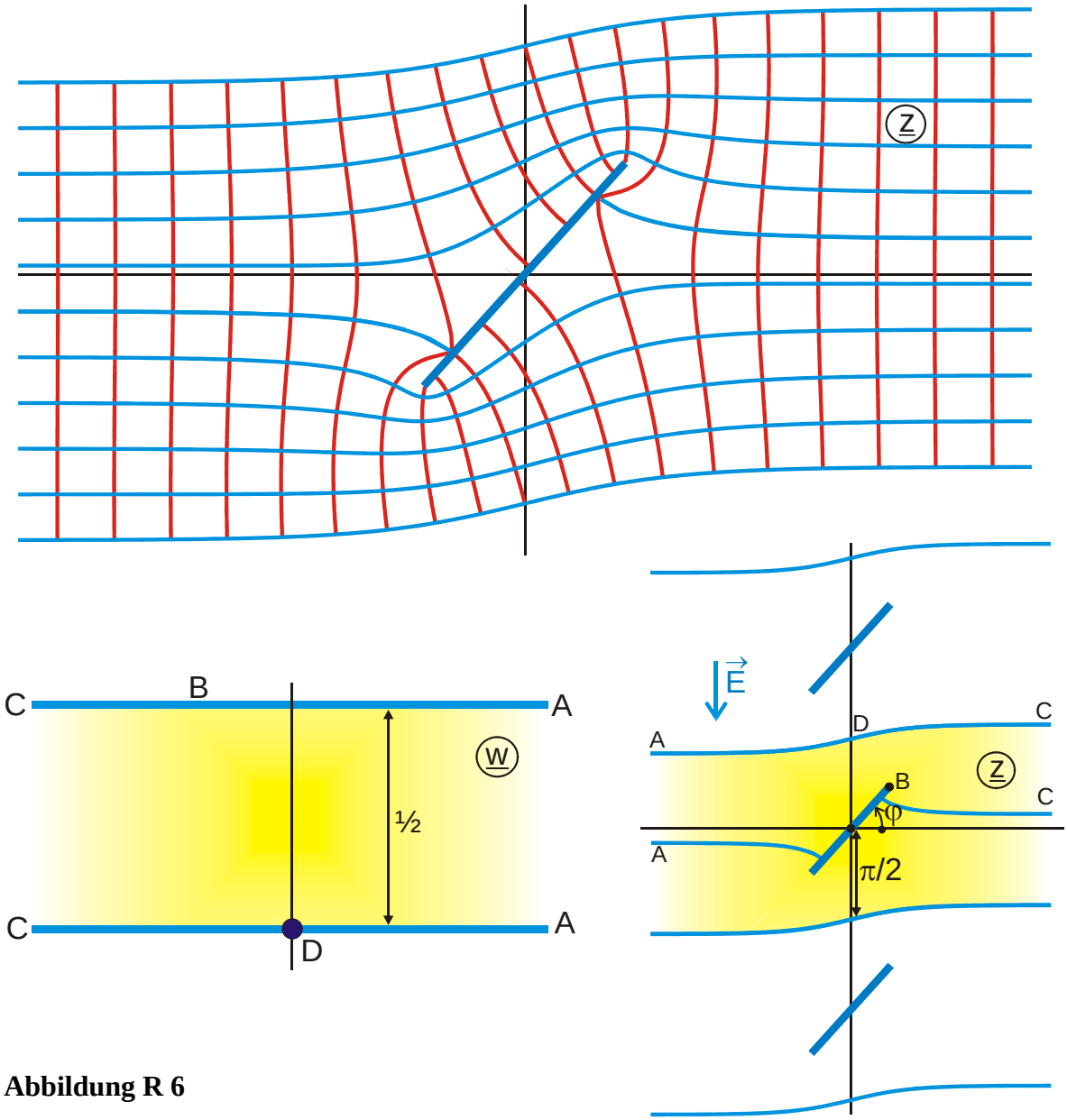


Abbildung R 6

$w_1 = \tanh(w\pi)$

$w_2 = \dfrac{1/p + p}{2w_1}$

$z = \exp(j2\varphi)\,\mathrm{ar\,tanh}(p/w_3) + \mathrm{ar\,tanh}\left(\dfrac{1}{pw_3}\right) + j\dfrac{\pi}{2}$

gegeben: p, φ

$w_B = \dfrac{1}{2\pi}\ln\dfrac{(w_{3B} - 1/p)(w_{3B} - p)}{(w_{3B} + 1/p)(w_{3B} + p)}$

$w_{3B} = \sqrt{\dfrac{p^2 + \exp(j2\varphi)}{1 + p^2\exp(j2\varphi)}}$

$s = |z(w_B)|$

$-1{,}166 \le u \le 1{,}166$ $\qquad$ $0 \le v \le 1/2$

$\varphi = 50°$ $\qquad$ $p = 0{,}5$

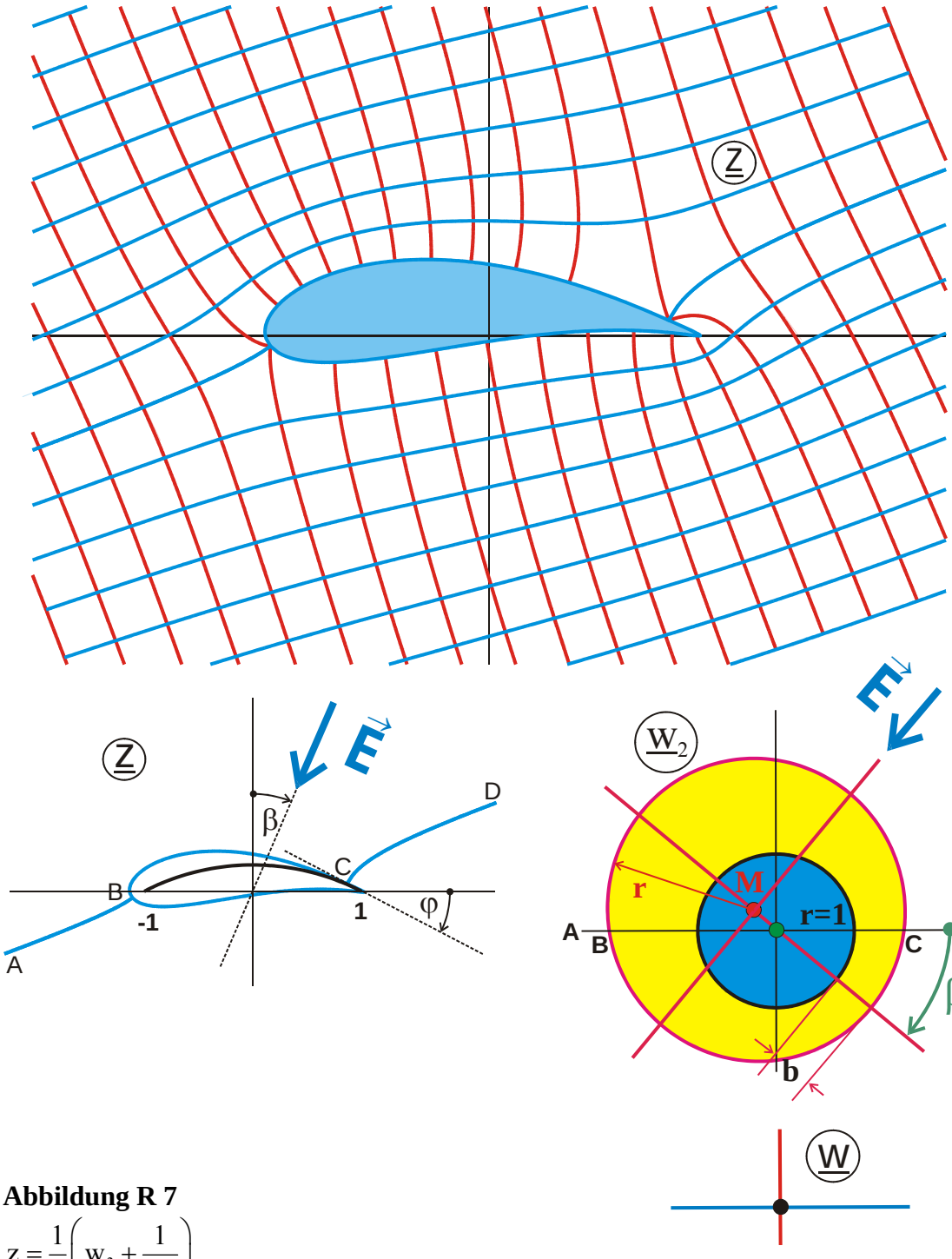


Abbildung R 7

$$z = \frac{1}{2}\left(w_3 + \frac{1}{w_3} \right)$$

$$w_3 = \frac{w_2 + j \sin\varphi}{\cos\varphi}$$

$$w_2 = \left(r w_1 - d \right) e^{-j\beta}$$

$$w_1 = w + \sqrt{w^2 - 1}$$

gegeben: φ, β, r, b

d = r - b - 1

$-2 \le u \le 2$

$-1{,}6 \le v \le 1{,}6$

$r \ge 1$

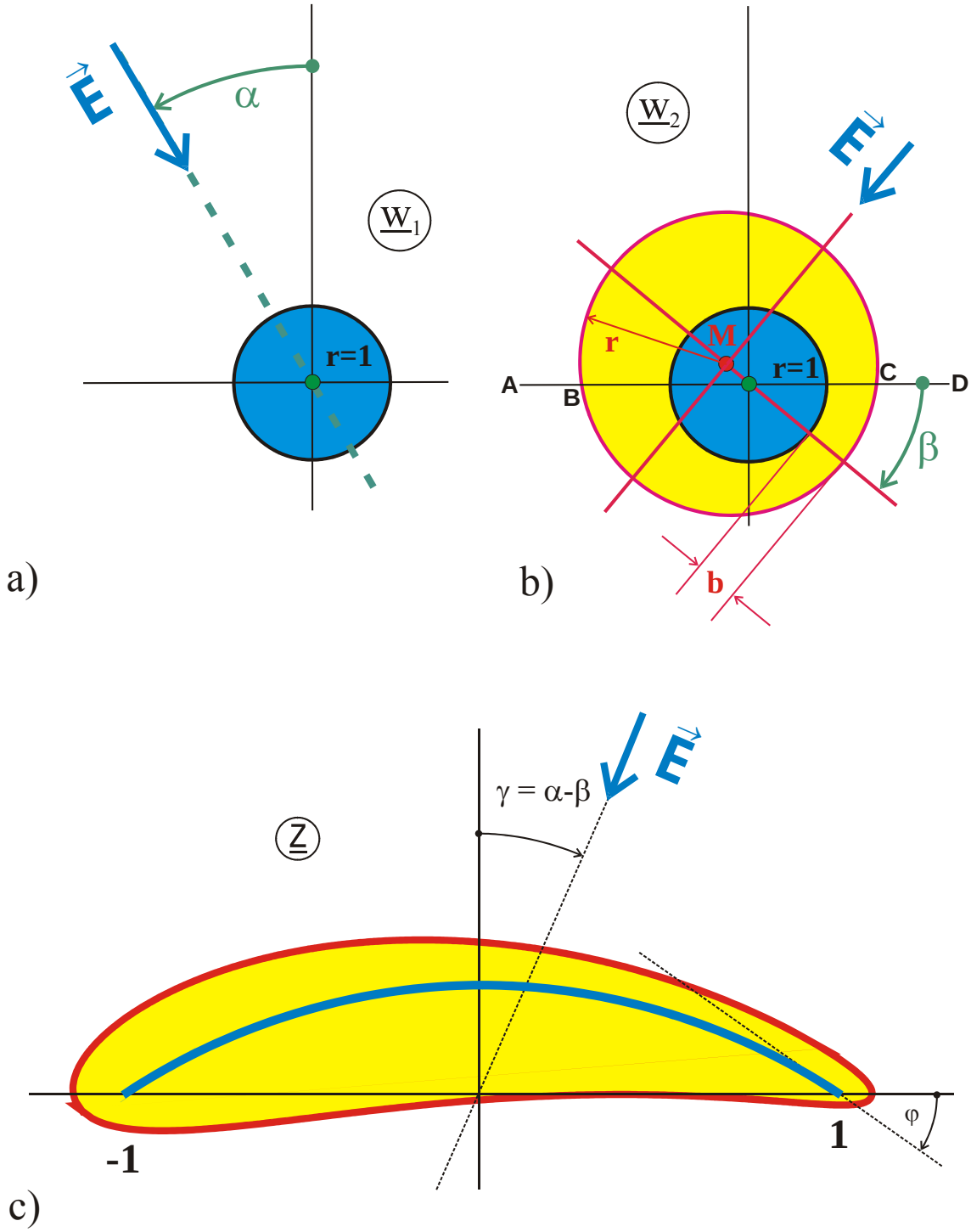
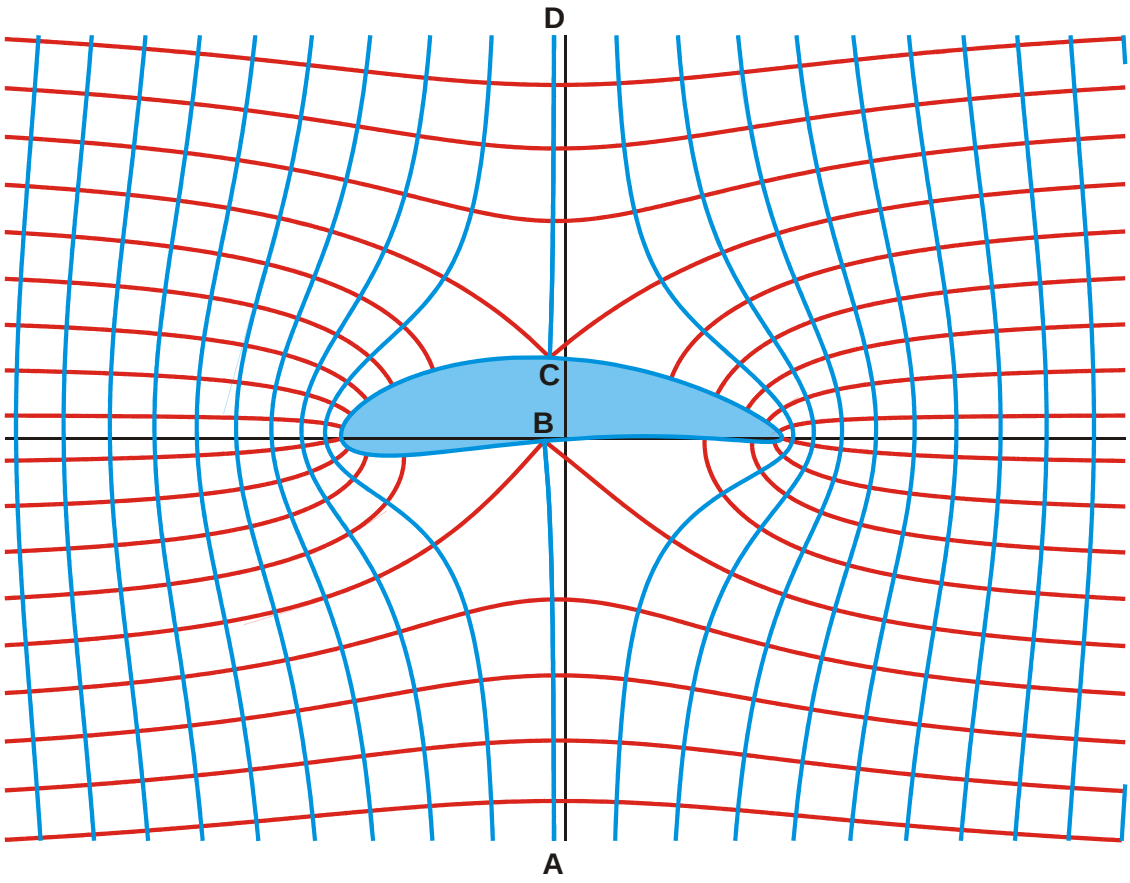


Abbildung R 7.1

Joukowsky-Profil für b = 0.



d)

Abbildung R 7.1

$$z = \frac{1}{2}\left(w_3 + \frac{1}{w_3} \right)$$

$$w_3 = \frac{w_2 + j \sin\varphi}{\cos\varphi}$$

$$w_2 = \left(r w_1 - d \right) e^{-j\beta}$$

$$w_1 = \left(w + \sqrt{w^2 - 1} \right) e^{j\alpha}$$

gegeben: α, φ, β, r, b

$d = r - b - 1$

$-2 \le u \le 2$

$-1{,}6 \le v \le 1{,}6$

$r \ge 1$

$\gamma = \alpha - \beta$

symmetrisches Profil für b = r - 1

Joukowsky-Profil für b = 0.

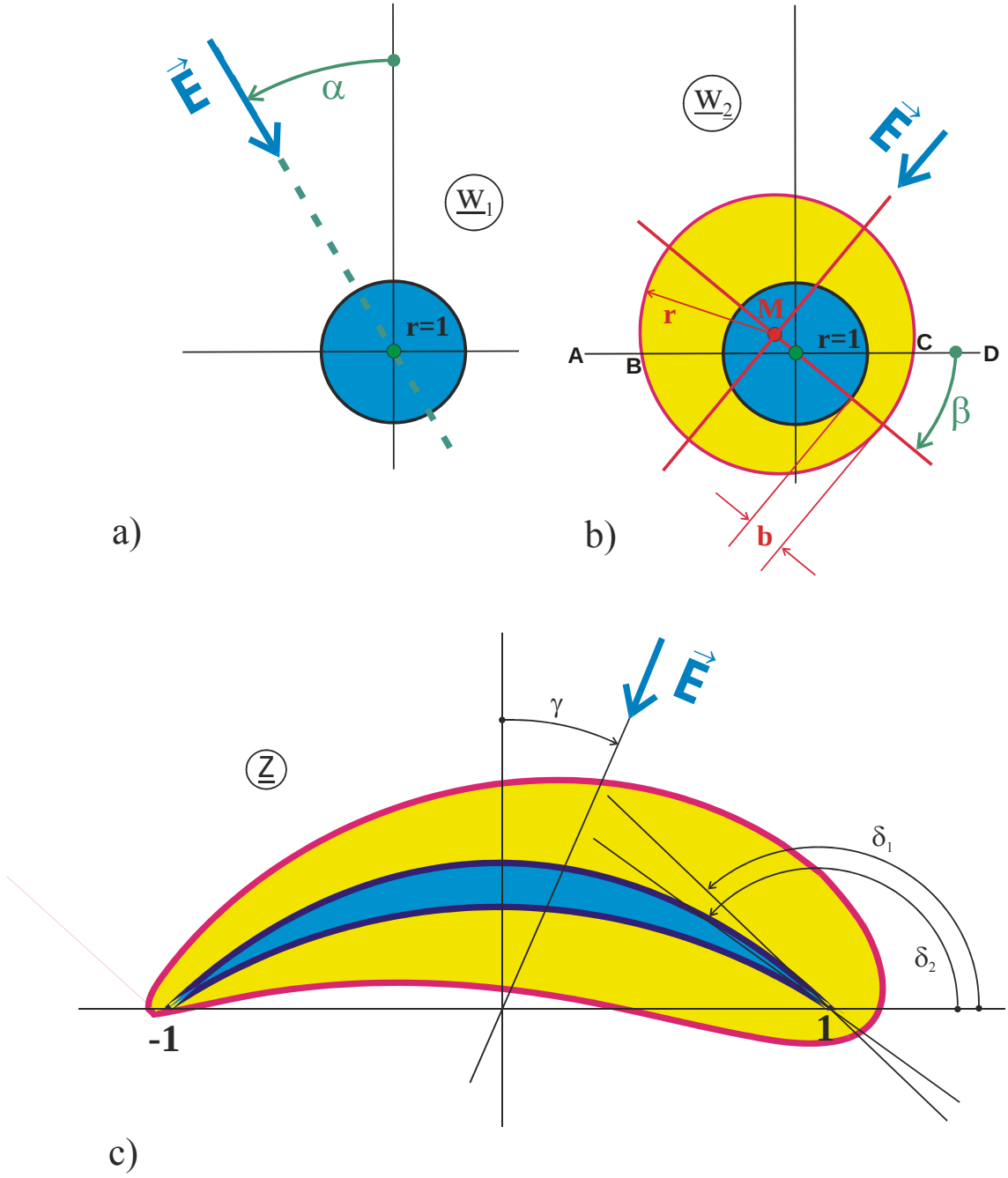
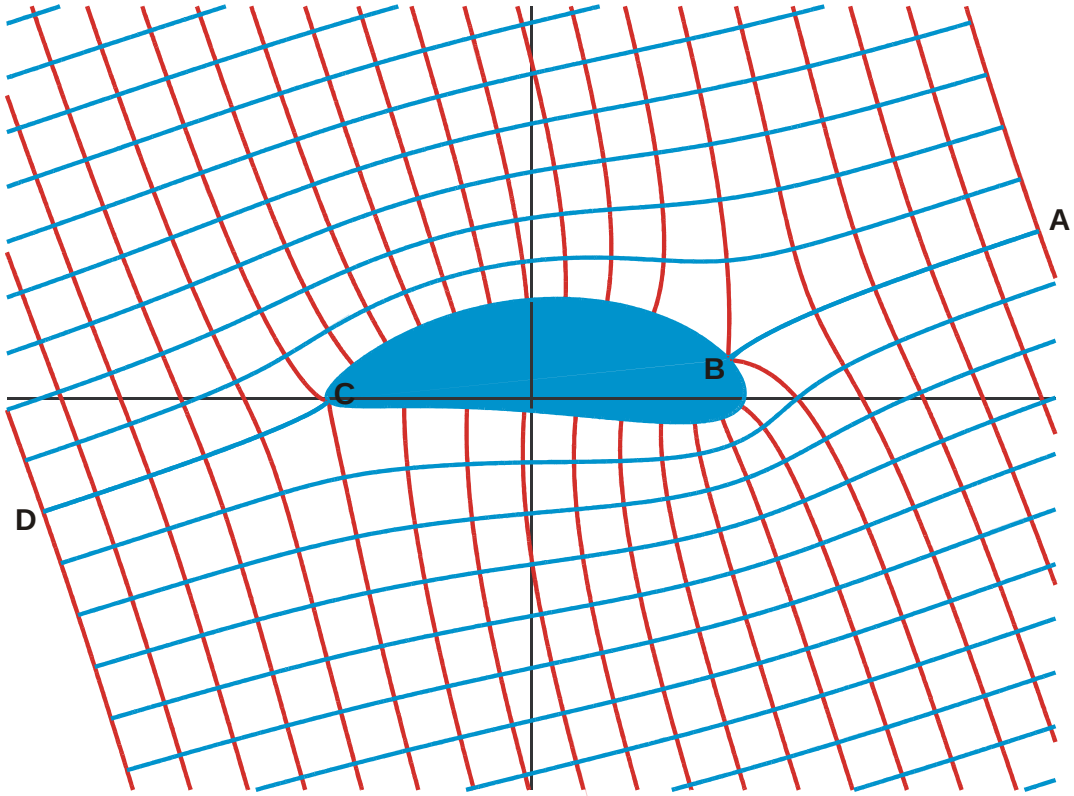


Abbildung R 7.2

Kármán-Trefftz-Profil für b = 0.



d)

Abbildung R 7.2

$$z = \frac{1 + w_4}{1 - w_4}$$

$$w_4 = e^{j\delta_2}\ w_3^{(2-\delta_2/\pi+\delta_1/\pi)}$$

$$w_3 = a + jb\frac{1 + w_2}{1 - w_2}$$

$$w_2 = \left(rw_1 - d\right)e^{-j\beta}$$

$$w_1 = \left(w + \sqrt{w^2 - 1}\right)e^{j\alpha}$$

$$\varphi = \frac{2\pi - \delta_2}{2 - \delta_2/\pi + \delta_1/\pi}$$

$$d = (r\text{-}1)\text{-}b$$

gegeben: α, β, δ_1, δ_2, r, b

$\gamma = f(\alpha, \beta, \delta_1, \delta_2)$

$a = \cos\varphi$

$b = \sin\varphi$

$r \geq 1$

$b \geq 1$

Kármán-Trefftz-Profil für b = 0.

Abbildungen Gruppe S

Leitende Elektroden, symmetrisch angeordnet, gleich große, gleichnamige Ladung

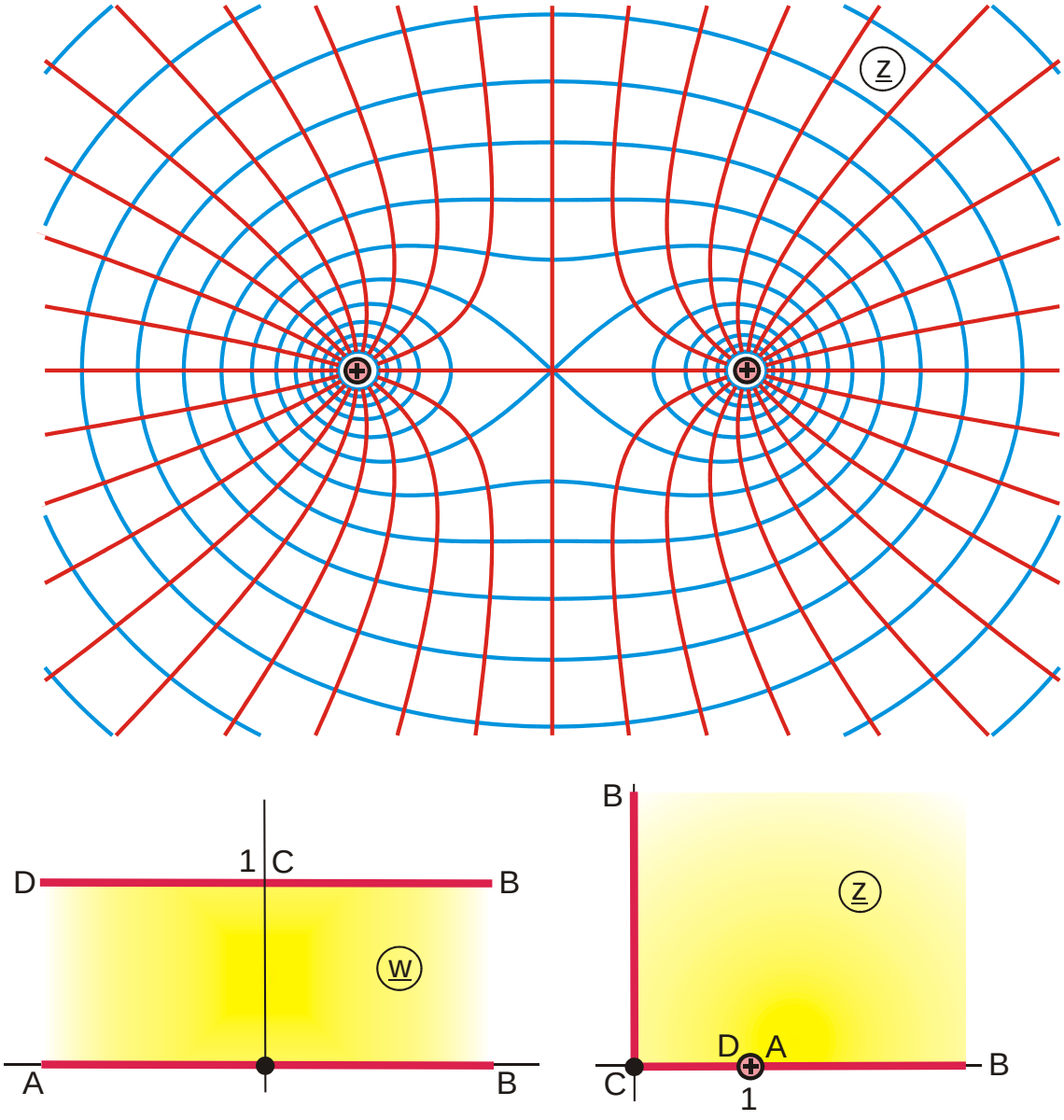


Abbildung S 1 (Cassinische Kurven, Sonderfall: Lemniskate = Kurve durch z = 0)

$z = \sqrt{1 + w_1}$

$w_1 = \exp(\pi w)$

$-0{,}5 \le u \le 1$ $\qquad$ $0 \le v \le 1$

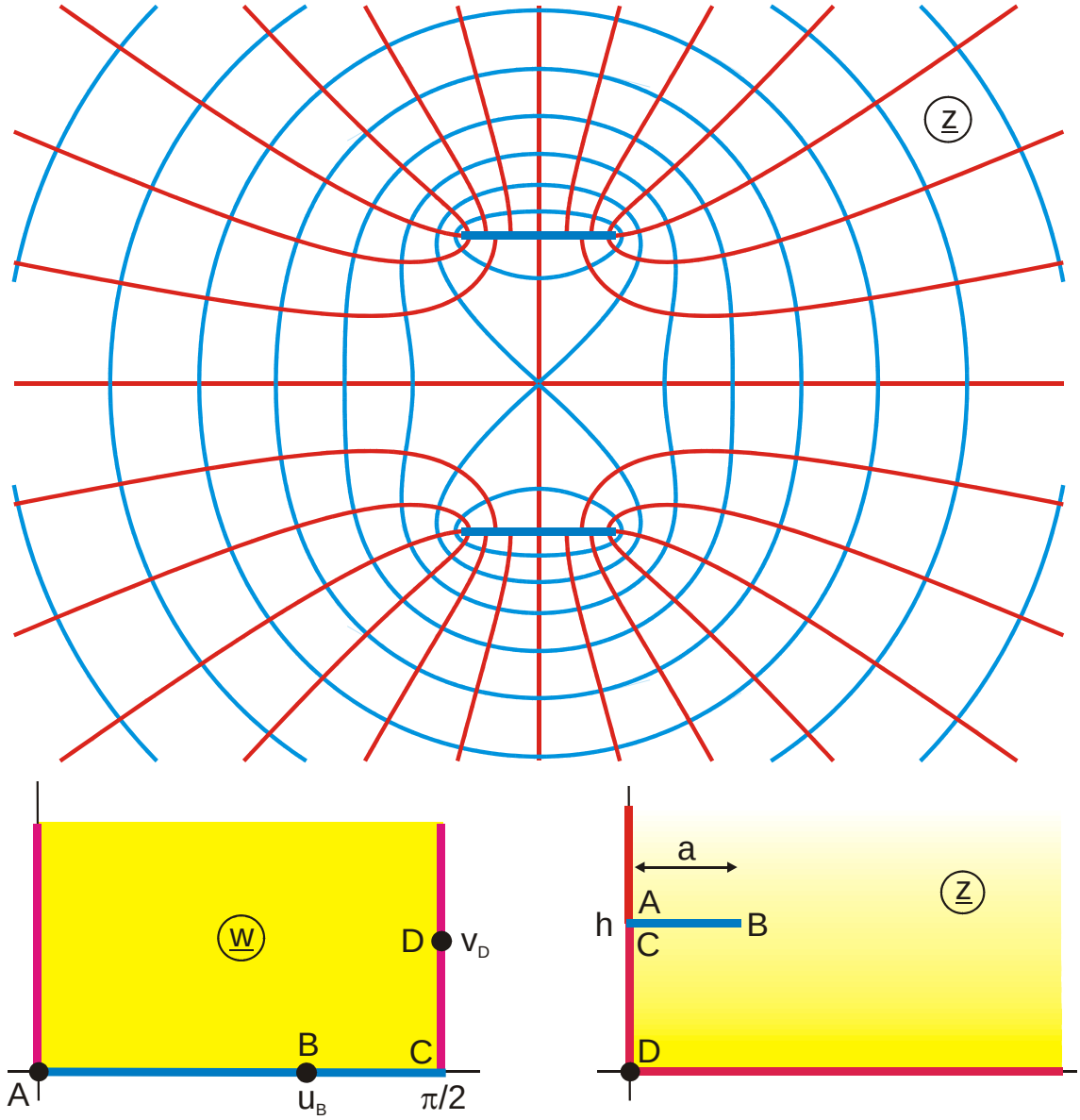


Abbildung S 2

$z = Z_t(w,k) + jh$

$a = \frac{\pi}{2K}$

$b = \frac{1}{k}\sqrt{1-\frac{E}{K}}$

$u_B = \arcsin b$

$v_D = \operatorname{arcosh}(1/k)$

$h = Z_t(u_B,k) = Z_a(b,k)$

$k = 0{,}925$ für $v_D = 0{,}4$

$0 \le u \le \pi/2$

$0 \le v \le 2$

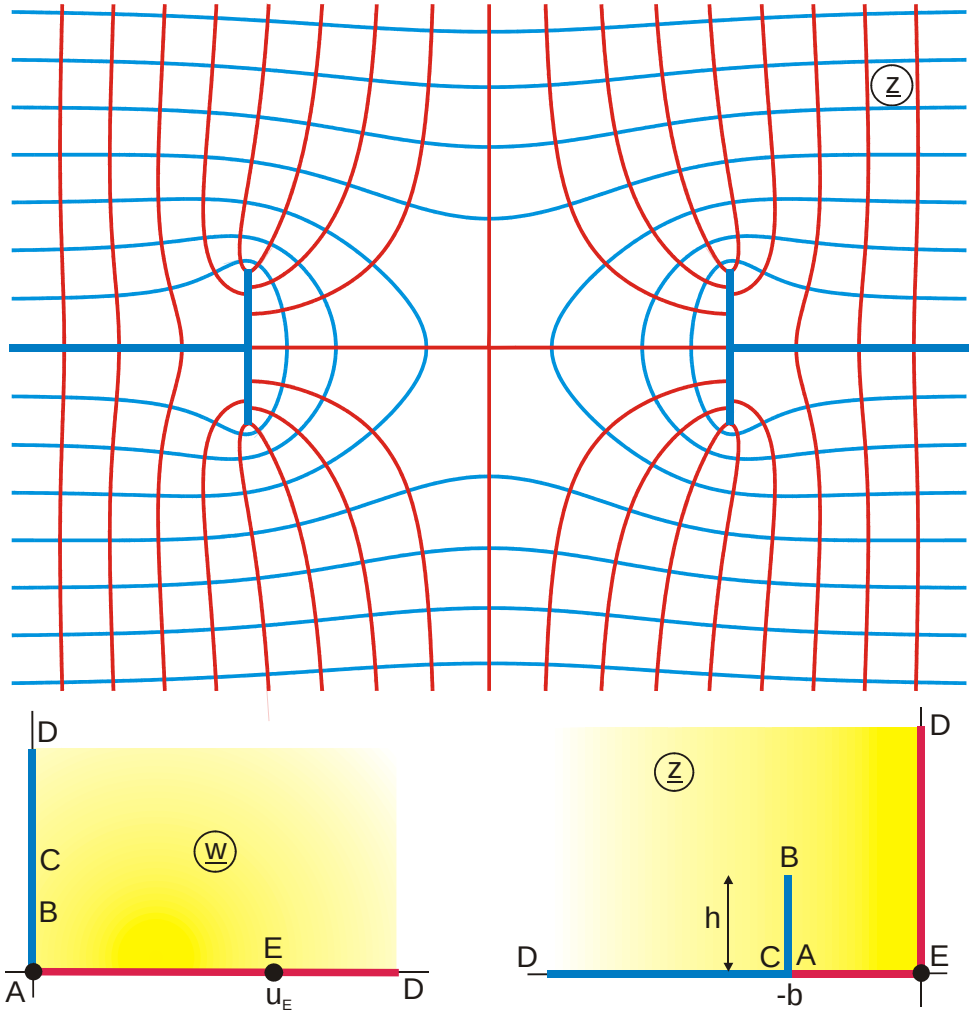


Abbildung S 2.1

$$z = Z_e(w_2, k) + \frac{\pi}{2K(k)K'(k)} w_2$$

$w_2 = F_t(w_1)$ $\qquad$ $w_1 = \arccos(w\pi)$

$$b = \frac{\pi}{2K'(k)} \qquad t = \frac{1}{k'}\sqrt{1 - \frac{E'(k)}{K'(k)}}$$

$$h = E_a(t, k') - \frac{E'(k)}{K'(k)} F_a(t, k') \qquad a = \frac{1}{k}\sqrt{\frac{E'(k)}{K'(k)}}$$

$0 \le u \le 1$ $\qquad$ $0 \le v \le 1$

gegeben: k $\qquad$ $u_E = 1/\pi$

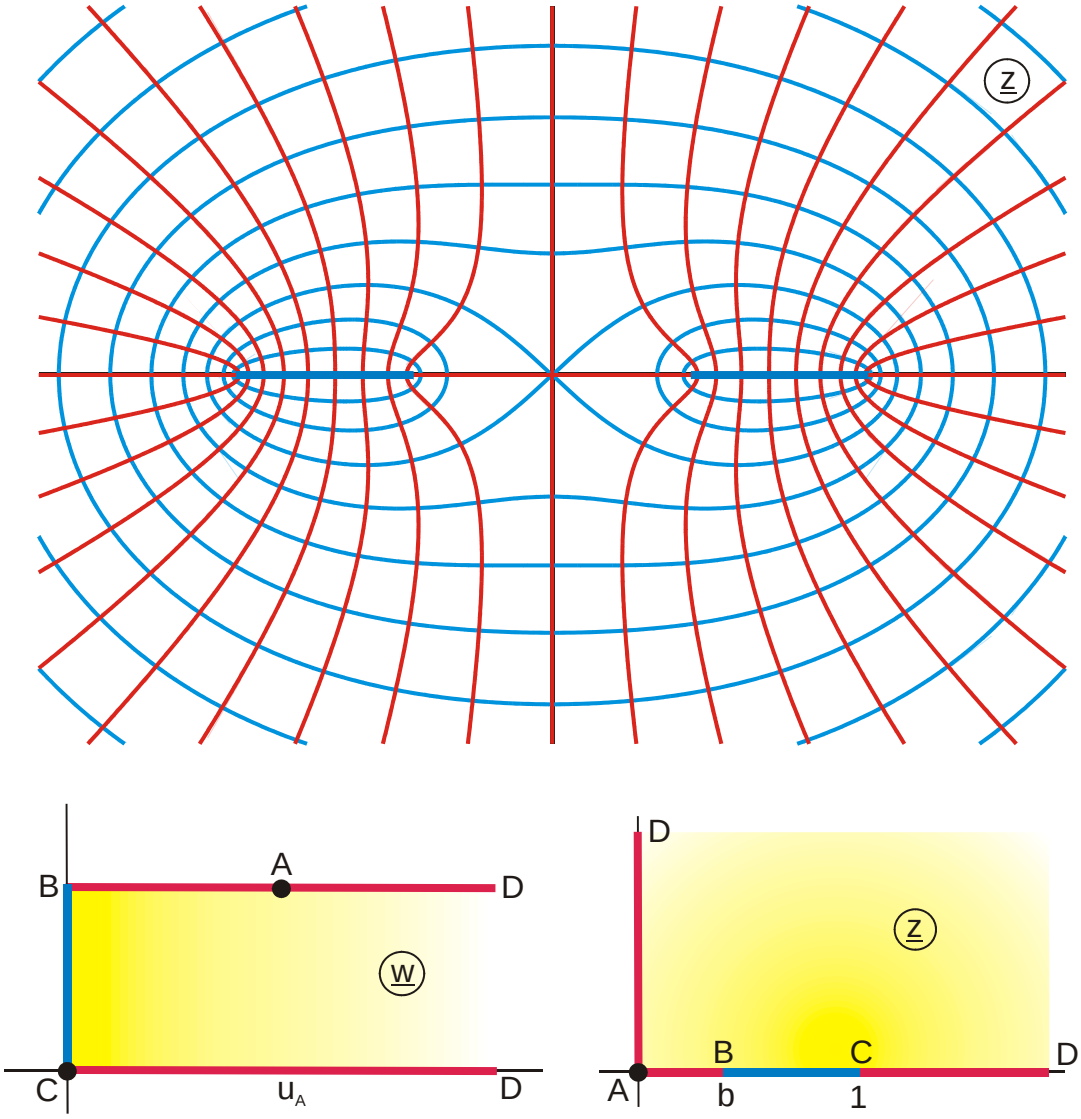


Abbildung S 2.2

$$z = \sqrt{\frac{a + \cosh(w\pi)}{a + 1}}$$

$$u_A = \frac{1}{\pi} \operatorname{ar\,cosh} a \qquad a = \frac{1 + b^2}{1 - b^2}$$

$0 \le u \le 1$ $\qquad$ $0 \le v \le 1$

$b = 0{,}4392$ für $u_A = 0{,}3$

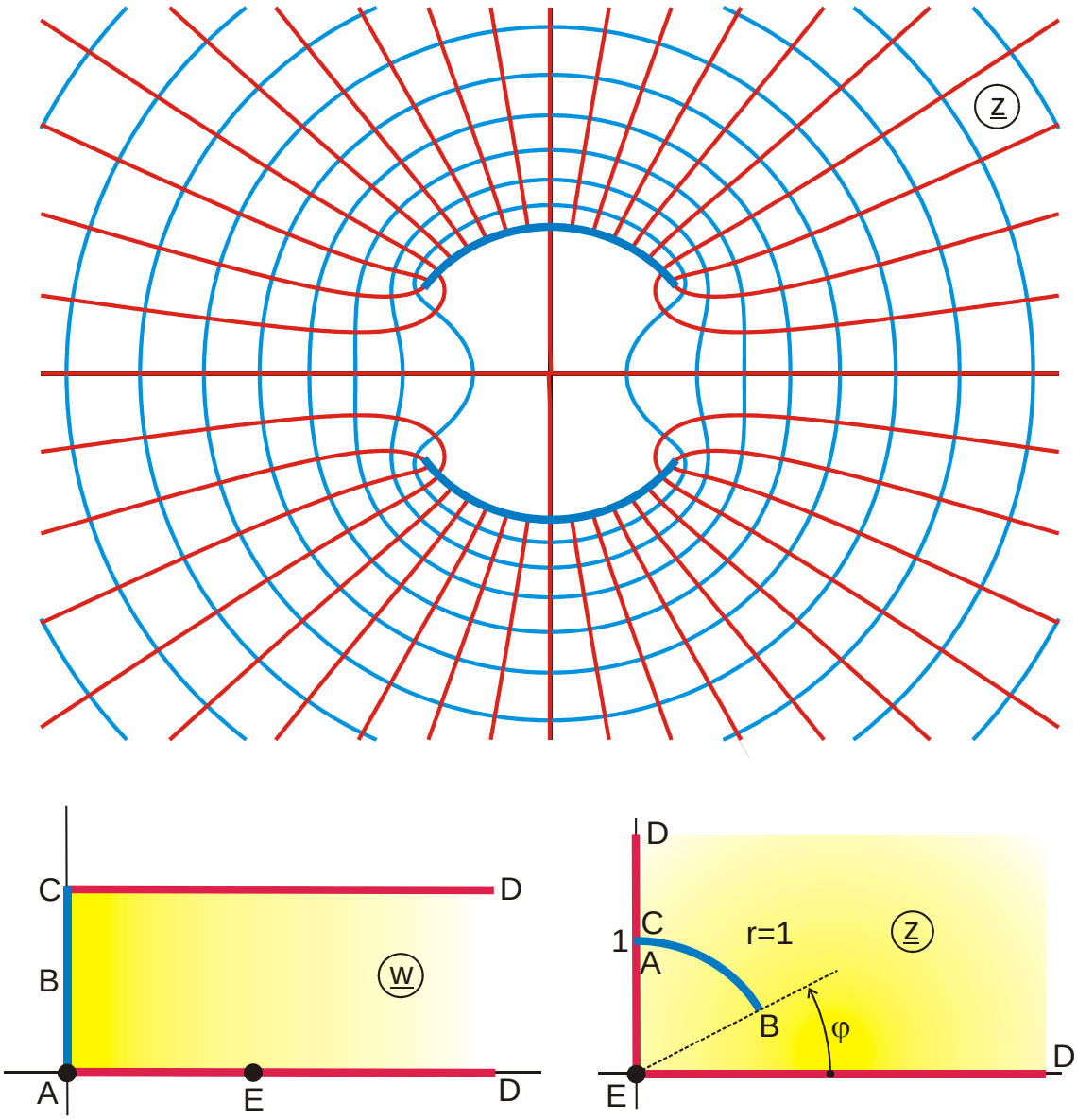


Abbildung S 3

$z = \sqrt{w_4}$

$w_4 = \dfrac{w_3 + j}{w_3 - j}$

$w_3 = -2b\dfrac{w_2}{w_2^{\,2} + 1}$

$w_2 = ja\dfrac{1 + w_1}{1 - w_1}$

$w_1 = \exp(\pi w)$

gegeben: φ

$a = \tan(\varphi / 2)$

$b = 1/\tan\varphi$

$v_B = \varphi/\pi$

$\varphi = 36{,}62°$

$0 \le u \le 1$

$0 \le v \le 1$

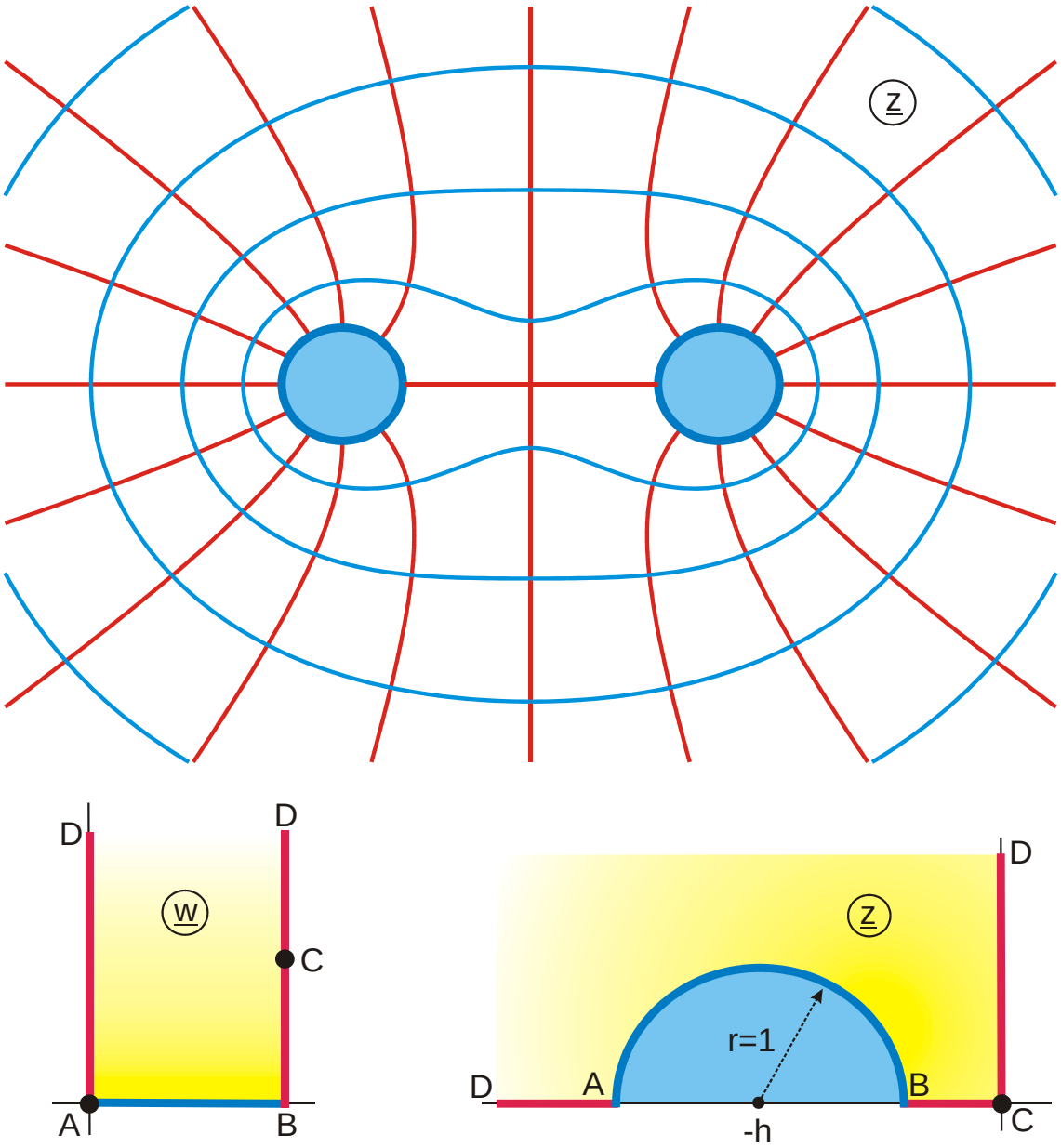


Abbildung S 4

$$z = \frac{\sigma - w_2}{\sigma w_2 - 1} + h$$

gegeben: h

$$w_2 = \exp(w_1)/\sigma^2$$

$$w_1 = -j\pi F_t(w\pi, k)/K(k)$$

$$k = \left(\frac{\vartheta_2[0,\tau]}{\vartheta_3[0,\tau]}\right)^2$$

$$\tau = \frac{1}{\pi}\ln\sigma$$

$$\sigma = h + \sqrt{h^2 - 1}$$

$$v_C = \frac{1}{\pi}\operatorname{ar\,cosh}(1/k)$$

$h = 3{,}105$ $\quad 0 \le u \le 0{,}5$ $\quad 0 \le v \le 0{,}5$

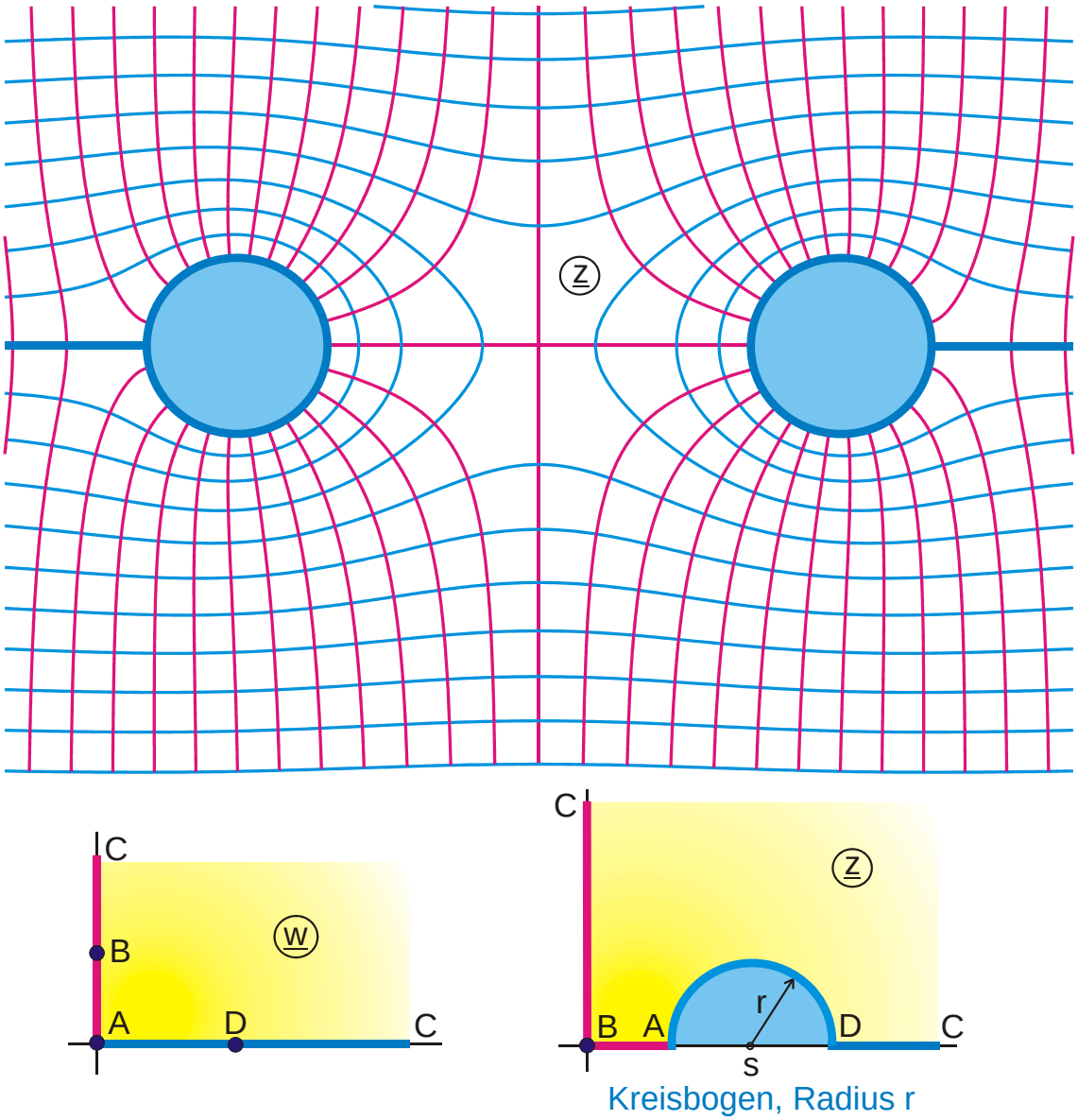


Abbildung S 4.1

$$z = \frac{1}{w_1} + h$$

$$w_1 = \frac{\exp(w_2)}{\exp(\pi/\tau)} - 1$$

$$w_2 = \left\{ \frac{w_3^{*} - jK'(jk_0)}{K(jk_0)} + 2 \right\} \frac{\pi}{\tau}$$

$$w_3 = F_a(w\pi, jk_0)$$

gegeben: k' > 1

$$k_0 = \sqrt{k'^2 - 1}$$

$$\tau = \frac{K'(jk_0)}{K(jk_0)}$$

$$K(jk_0) = \frac{K(k_0/k')}{k'}$$

$$K'(jk_0) = \frac{K(1/k')}{k'}$$

$0 \le v \le 1$

$0 \le u \le 1.5$

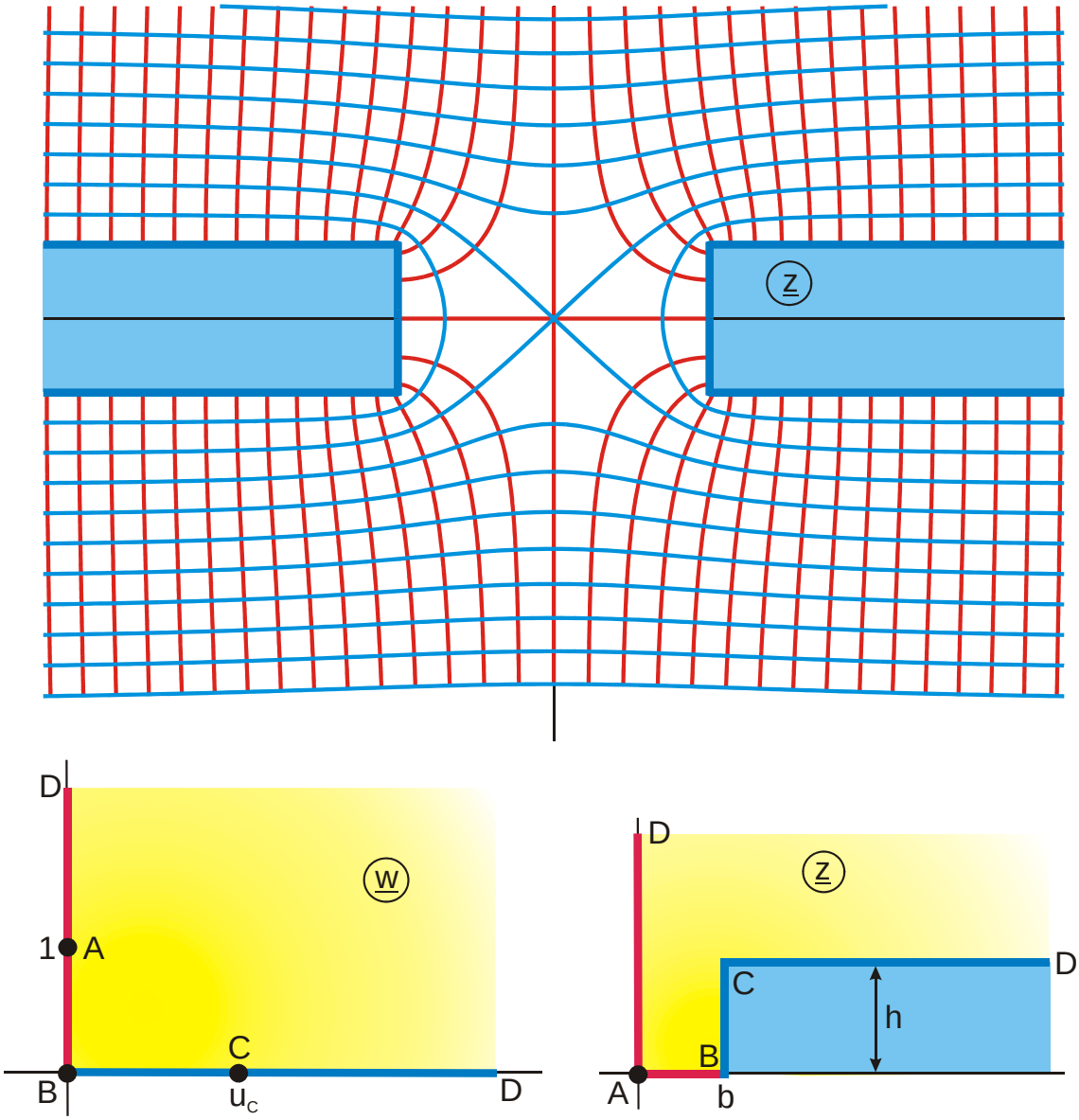


Abbildung S 5

$z = E_a(w_1, k)$

$w_1 = \sqrt{w^2 + 1}$

$h = K'(k) - E'(k)$

$0 \le u \le 10$

gegeben: k

$b = E(k)$

$u_C = \sqrt{1/k^2 - 1}$

$0 \le v \le 5$

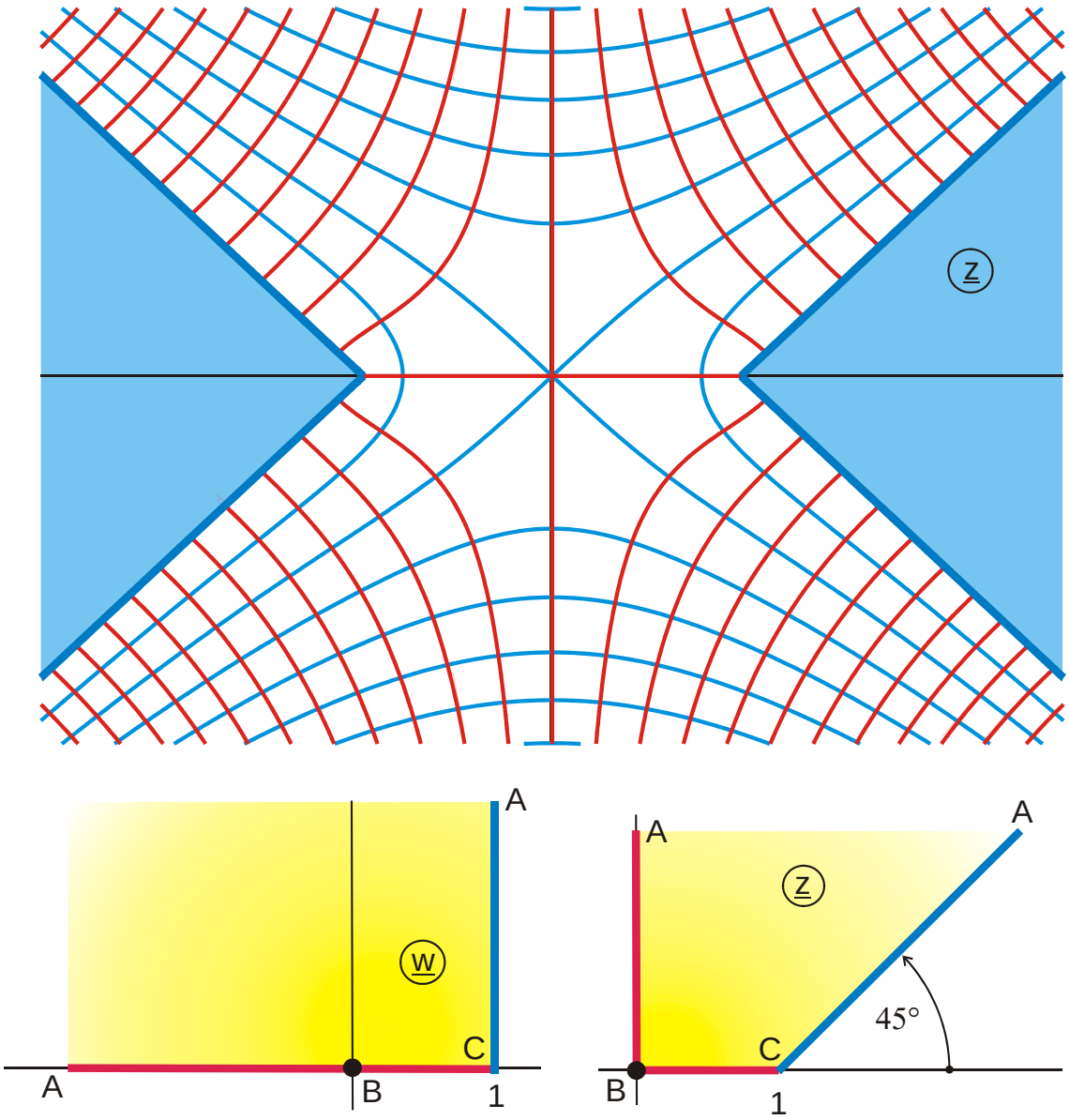


Abbildung S 6

$$z = \frac{1}{a} B_a\left(\sqrt{w}, k\right)$$

$a = 2\,E(k) - K(k)$ $\qquad$ $k = \frac{1}{\sqrt{2}}$

$-5 \le u \le 1$ $\qquad$ $0 \le v \le 6$

Abbildungen Gruppe T

Abbildungen mit nichtleitenden Rändern

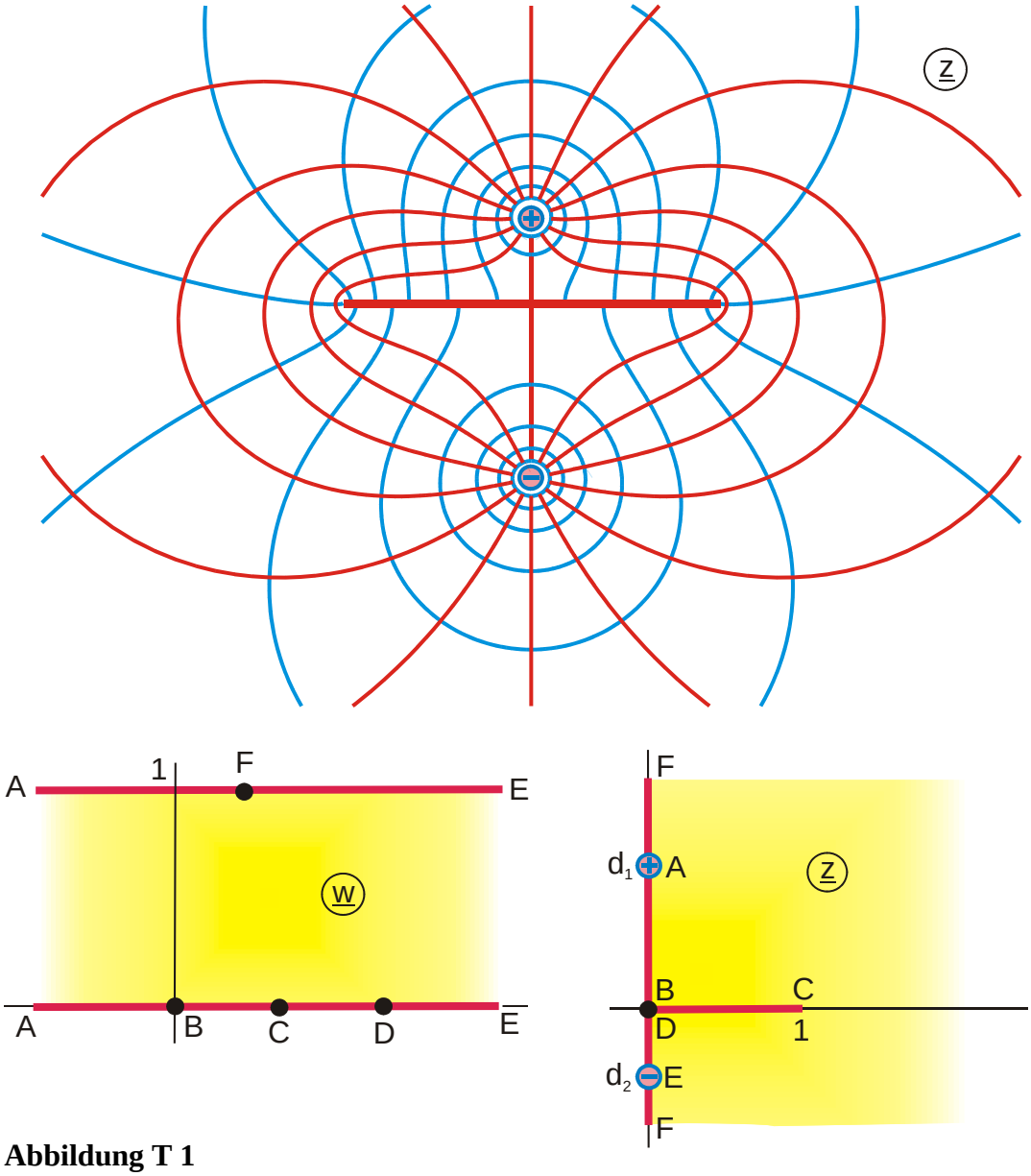


Abbildung T 1

$$z = \frac{2w_2}{w_2^{\,2} + 1}$$

$$w_1 = \exp(w\pi)$$

$$a_1 = \frac{1}{d_1} + \sqrt{\frac{1}{d_1^{\,2}} + 1}$$

$$-0{,}3 \le u \le 2{,}1$$

$$w_2 = \sqrt{\frac{b_1 - b_2 w_1}{w_1 - 1}}$$

$$b_1 = a_1^{\,2} \text{ und } b_2 = a_2^{\,2}$$

$$a_2 = \frac{1}{d_2} + \sqrt{\frac{1}{d_2^{\,2}} + 1}$$

$$0 \le v \le 1$$

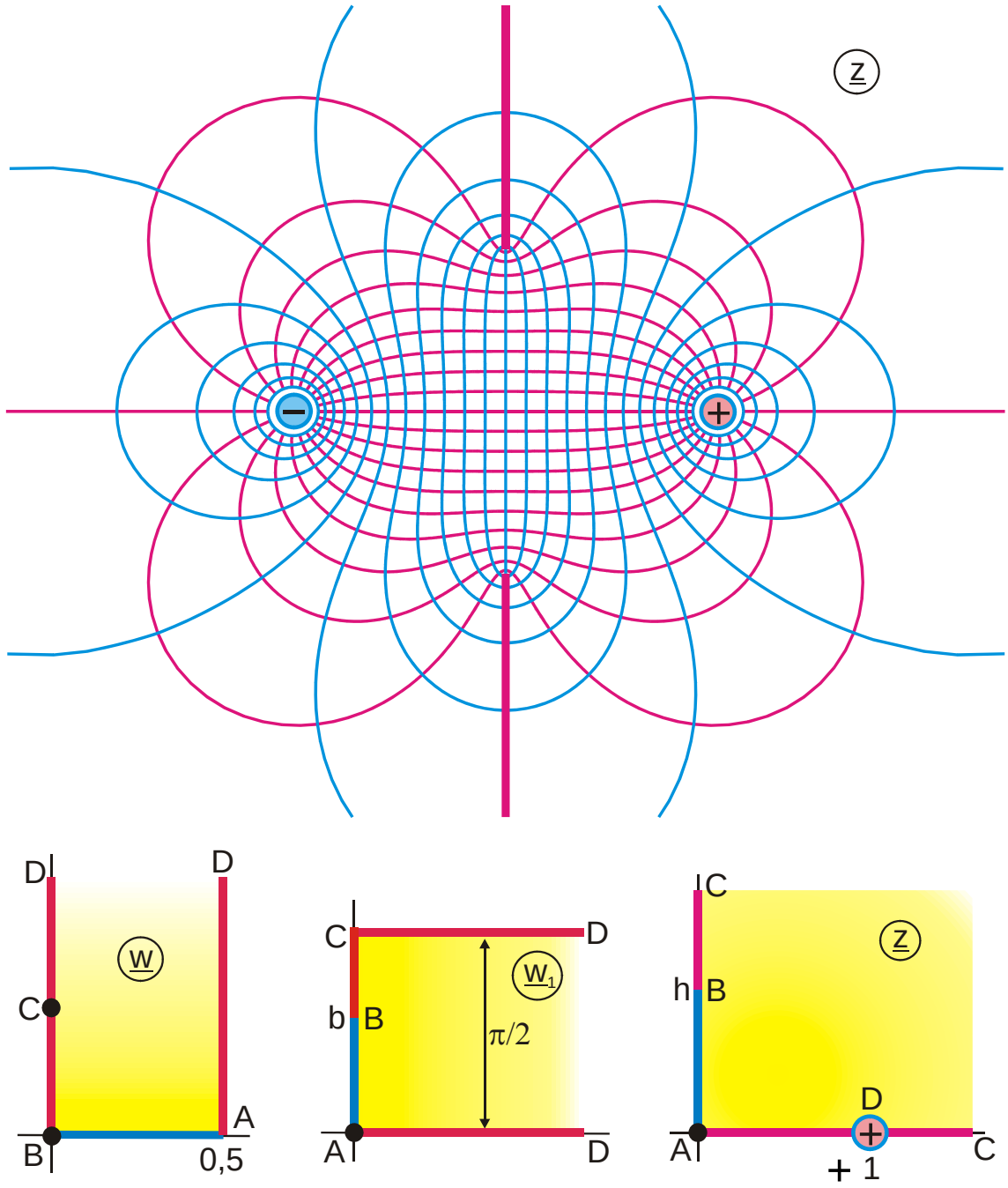


Abbildung T 1.1

$z = \tanh(w_1)$

$w_1 = ar\sinh\left[j\sigma\cos(w\pi)\right]$

$\sigma = \sin b$

$v_C = \frac{1}{\pi} ar\cosh\frac{1}{\sigma}$

$b = \arctan h$

$b = \pi/2$ für $\sigma = 1$

$0 \le u \le 0{,}5$

$0 \le v \le 0{,}6$

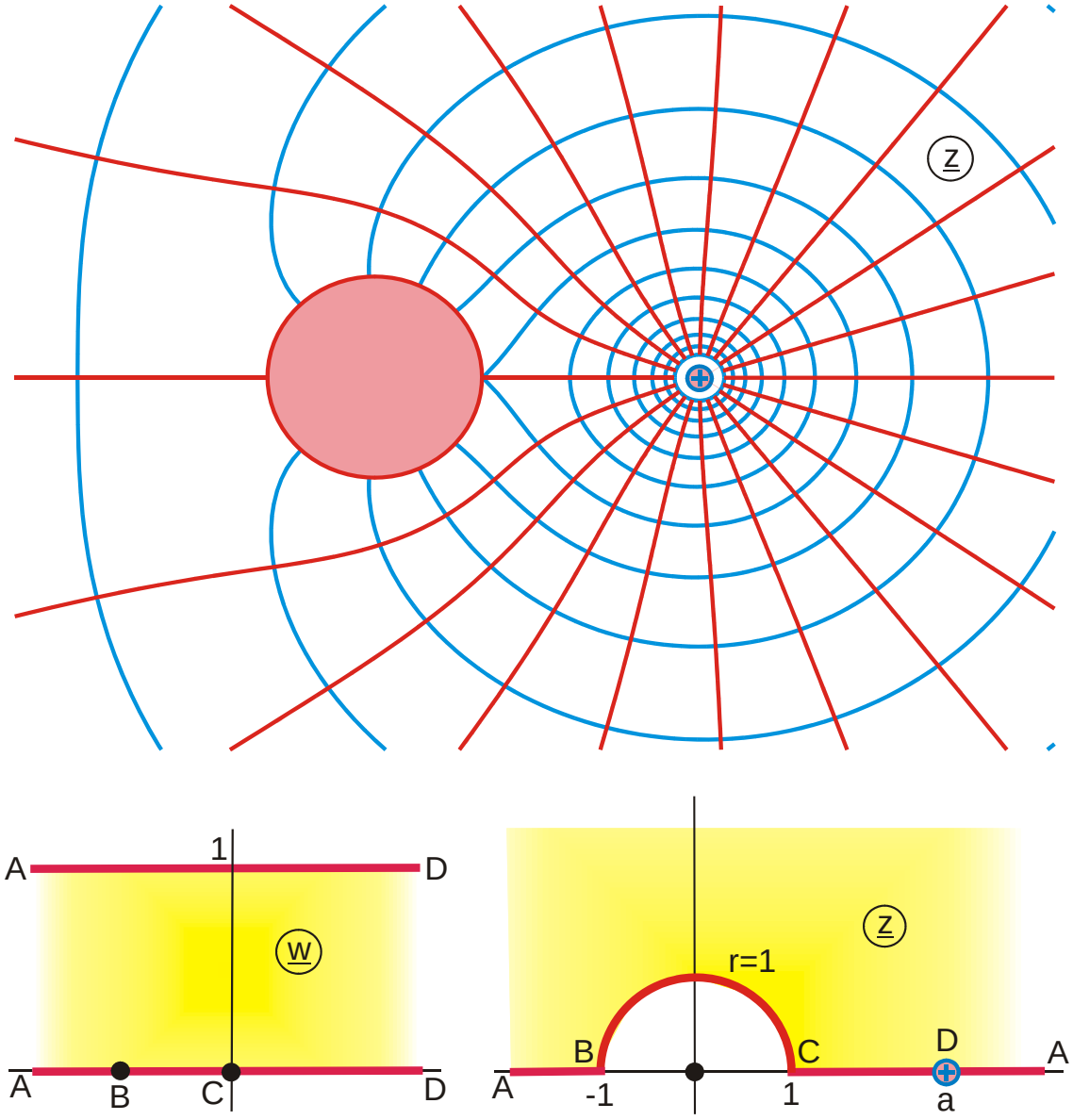


Abbildung T 2

$z = \exp(2w_3)$

$w_3 = ar\tanh w_2$

$w_2 = \sqrt{\dfrac{w_1 - 1}{b^2 w_1 - 1}}$

$w_1 = \exp(w\pi)$

$b = 1/\tanh\dfrac{\ln a}{2}$

$u_B = -\dfrac{2}{\pi}\ln b$

$-0{,}8 \le u \le 0{,}7$

$0 \le v \le 1$

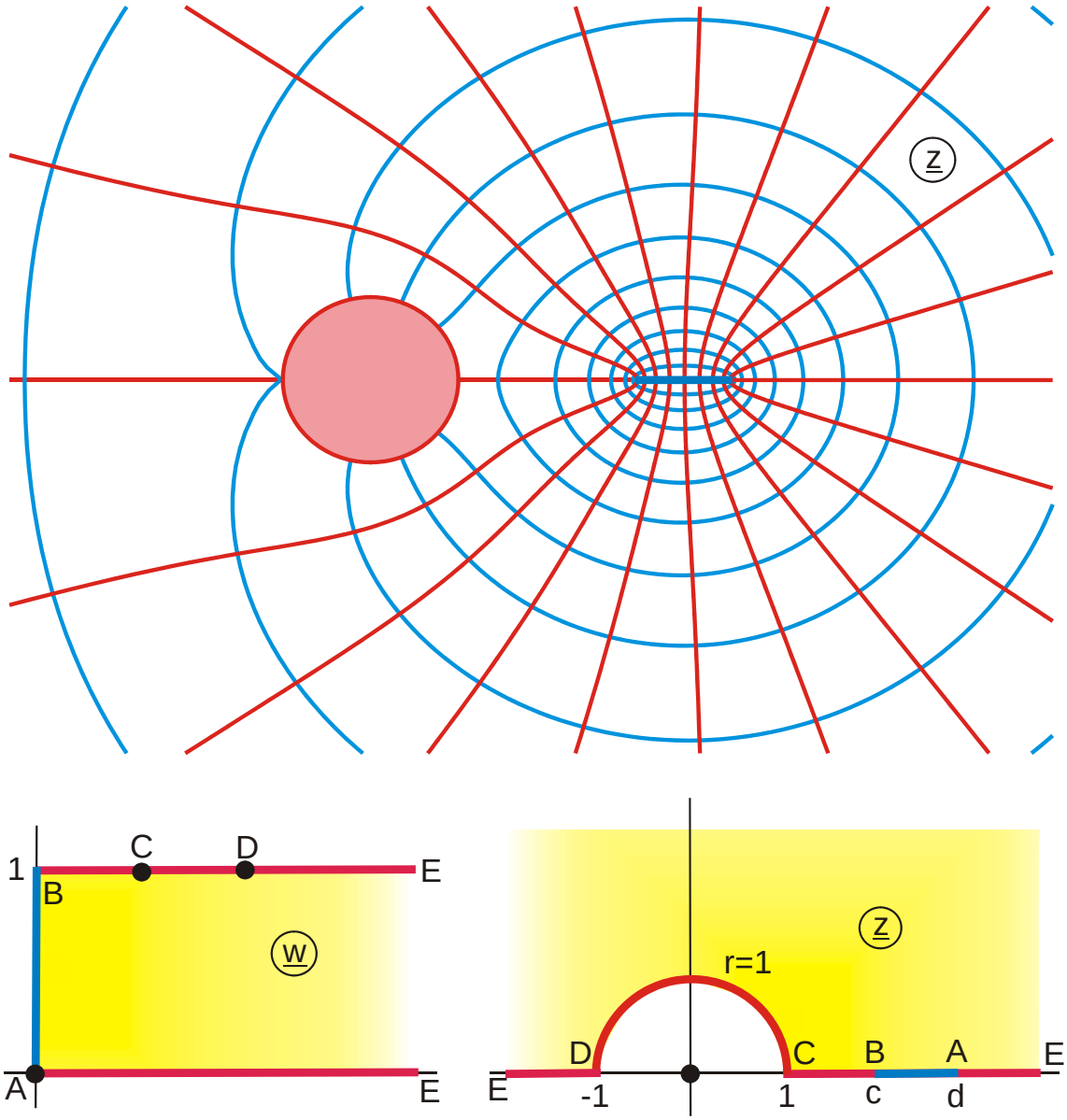


Abbildung T 2.1

$z = \exp(w_2)$

$w_2 = j\left(\pi/2 - \arcsin w_1\right)$

$w_1 = \frac{a}{2}\{\cosh(w\pi) + 1\} + b$

$s = \ln c$

$h = \ln d$

$b = \cosh s$

$a = -b + \cosh h$

$u_C = \frac{1}{\pi} \operatorname{ar\,cosh}\left\{\frac{2}{a}(1-b)+1\right\}$

$u_D = \frac{1}{\pi} \operatorname{ar\,cosh}\left\{\frac{2}{a}(1+b)+1\right\}$

$0 \le u \le 1{,}2$

$0 \le v \le 1$

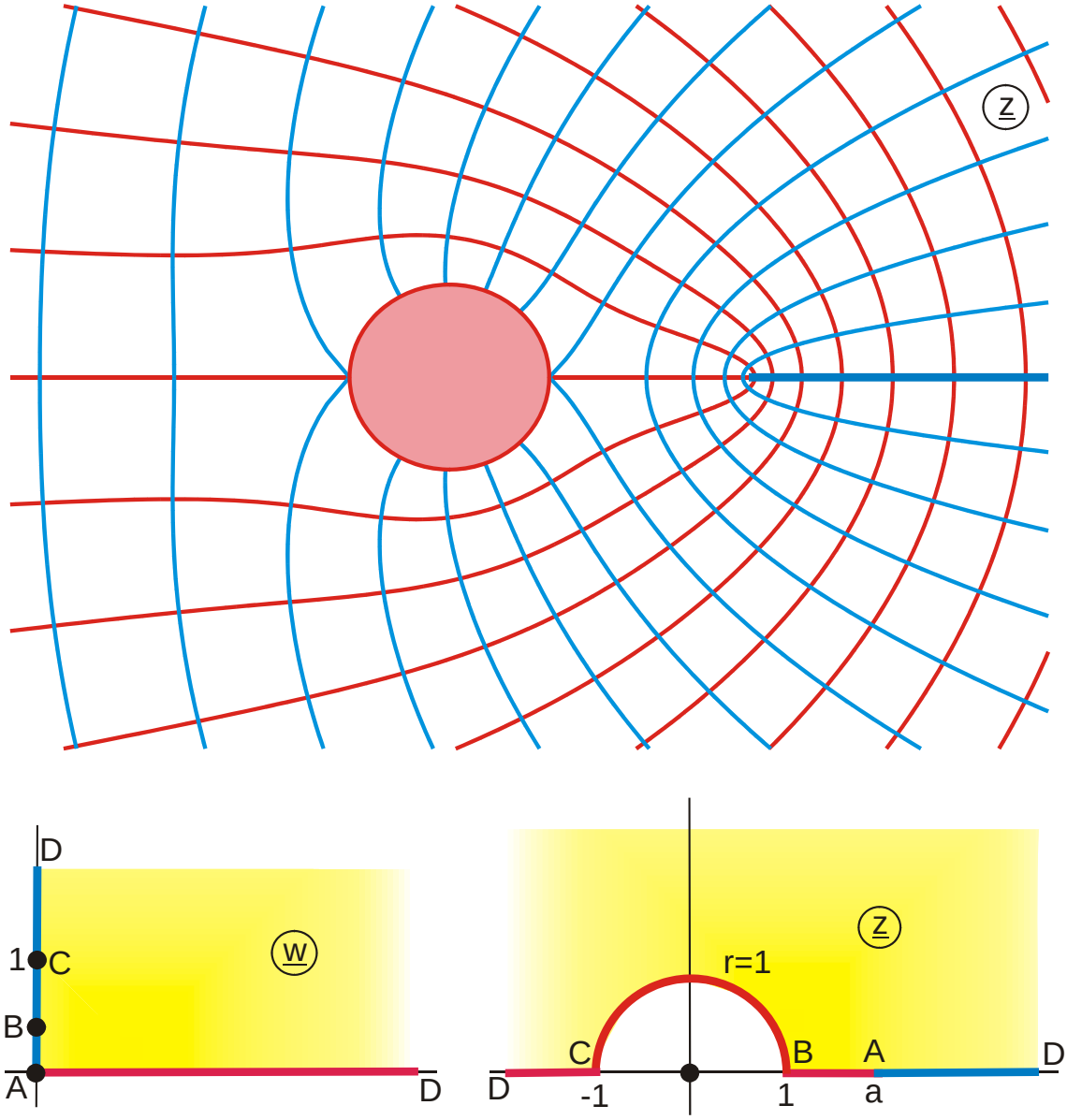


Abbildung T 2.2

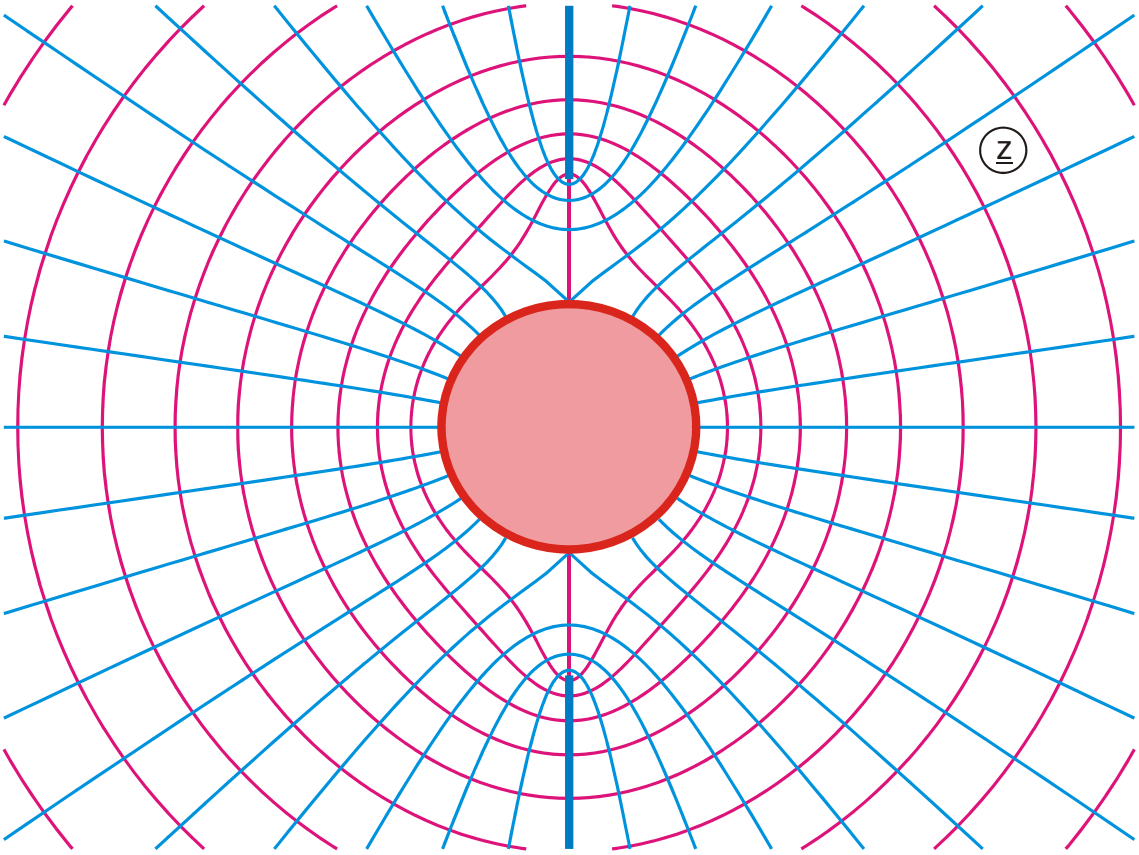
$$z = \exp(2w_1)$$

$$w_1 = ar\cosh\left(\sigma\sqrt{w^2+1}\right)$$

$h = 0{,}5 \ln a$ $\qquad$ $\sigma = \cosh h$

$v_B = \sqrt{1-1/\sigma^2}$

$0 \le u \le 1{,}5$ $\qquad$ $0 \le v \le 1{,}5$



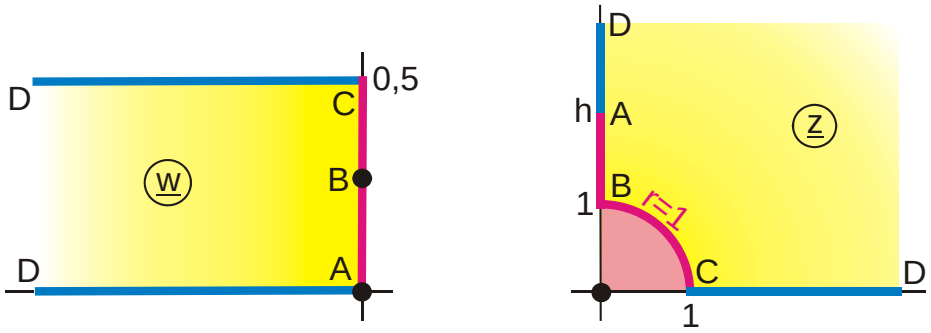


Abbildung T 2.3

$z = jw_1 + \sqrt{1 - w_1^2}$

$w_1 = a\,(w_0 + 1/w_0)$ $\qquad$ $w_0 = \exp(w\pi)$

$a > 0{,}5 : h = 1$ für $a = 0{,}5$

$-0{,}5 \le u \le 0$ $\qquad$ $0 \le v \le 0{,}5$

$v_B = \frac{1}{\pi}\arccos\left(\frac{1}{2a}\right)$ $\qquad$ $h = 2a + \sqrt{4a^2 - 1}$

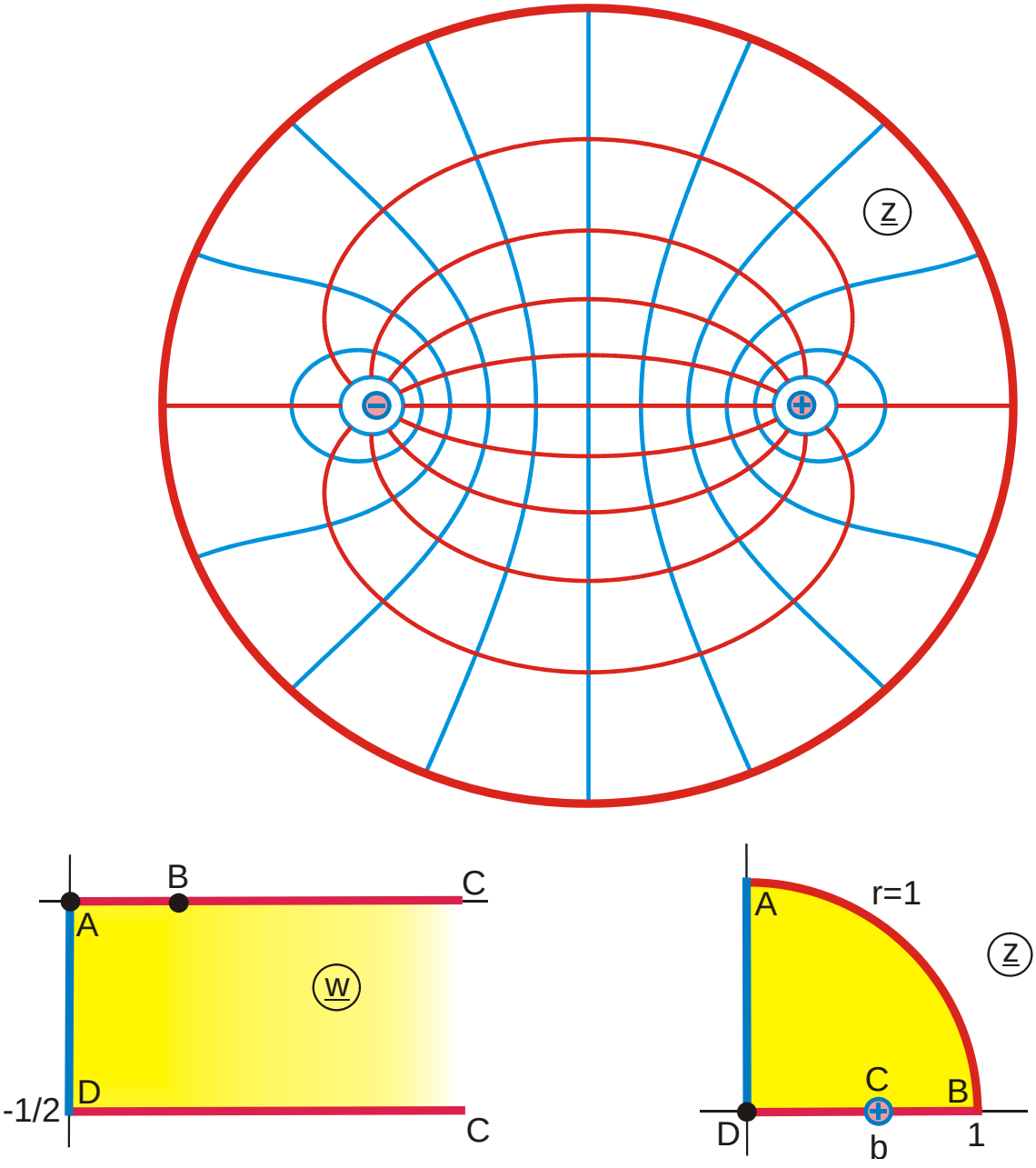


Abbildung T 3

$z = \exp(w_3 / 2)$

$w_3 = j\left(\pi/2 - \arcsin w_2\right)$

$w_2 = (1+a)w_1 - 1$

$w_1 = \tanh^2(w\pi)$

$h = 2 \ln b$

$a = \cosh h$

$u_B = \frac{1}{\pi} \operatorname{ar\,tanh} \sqrt{\frac{2}{1+a}}$

$0 \le u \le 0{,}5$

$-0{,}5 \le v \le 0$

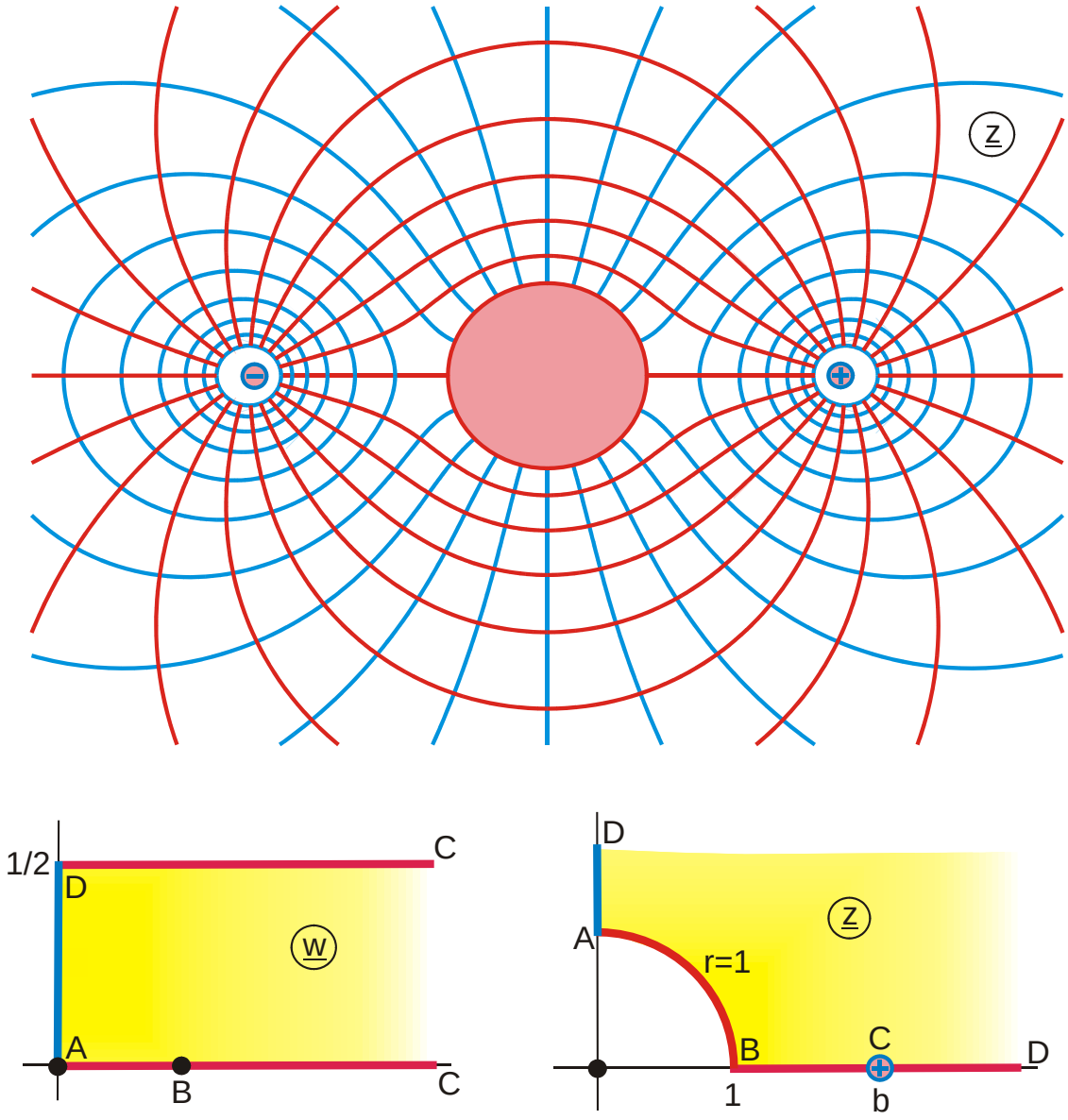


Abbildung T 3.1

$z = \exp(w_3 / 2)$

$w_3 = j\left(\pi/2 - \arcsin w_2\right)$

$w_2 = (1+a)w_1 - 1$

$w_1 = \tanh^2(w\pi)$

$h = 2 \ln b$

$a = \cosh h$

$u_B = \frac{1}{\pi} \operatorname{ar\,tanh} \sqrt{\frac{2}{1+a}}$

$0 \le u \le 0{,}6$

$0 \le v \le 0{,}5$

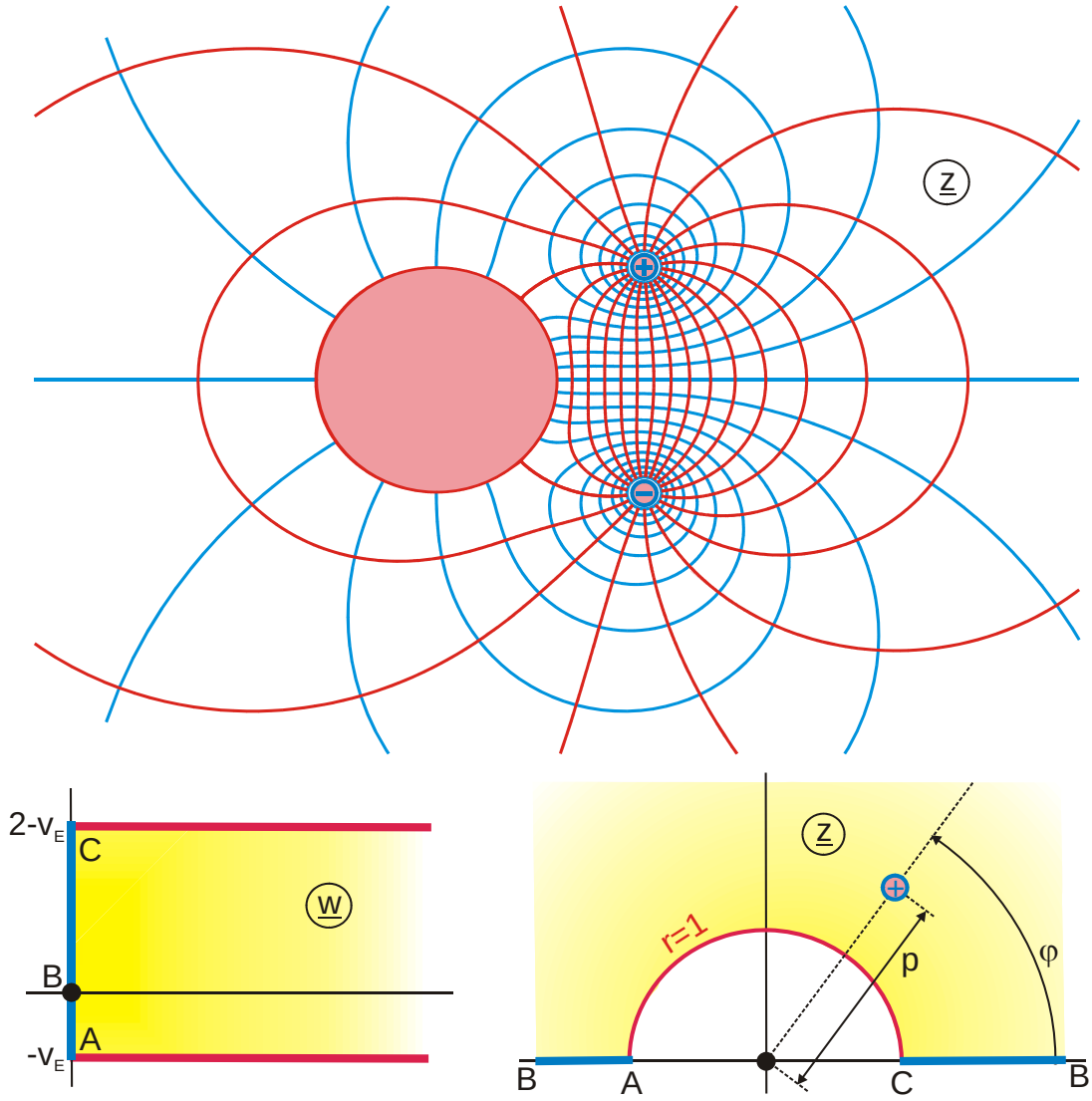


Abbildung T 3.2

$$z = \sqrt{\frac{c}{a} + \left(\frac{b}{2a}\right)^2} - \frac{b}{2a}$$

$a = 1 - w_1$

$b = (p + 1/p)[w_1 \exp(j\varphi) - \exp(-j\varphi)]$

$c = w_1 \exp(j2\varphi) - \exp(-j2\varphi)$

$w_1 = \exp(\pi w)$

$v_E = 2\varphi/\pi$

$0 \le u \le 1$

$-v_E \le v \le 2-v_E$

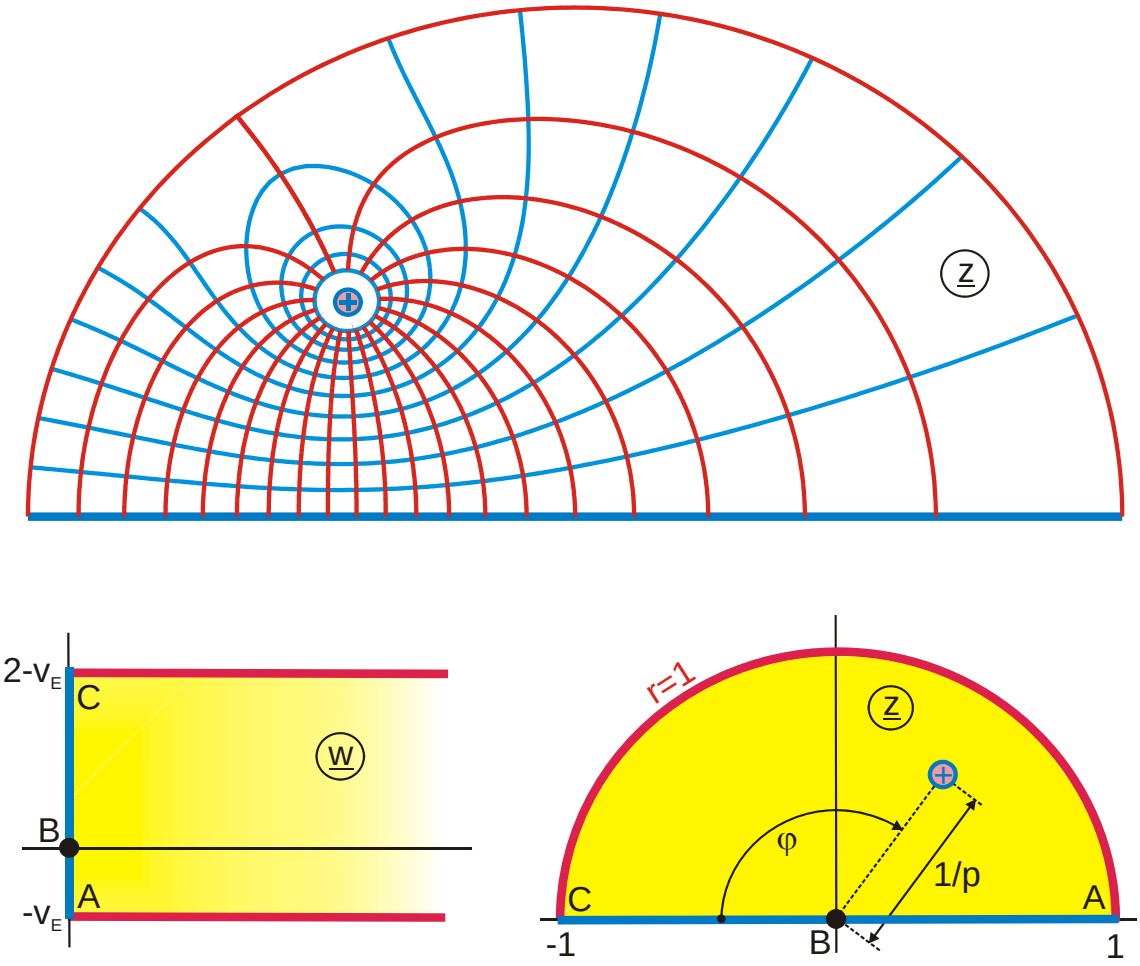


Abbildung T 3.3

$z = -1/w_2$

$w_2 = \sqrt{\frac{c}{a} + \left(\frac{b}{2a}\right)^2} - \frac{b}{2a}$

$a = 1 - w_1$

$b = (p + 1/p)[w_1 \exp(j\varphi) - \exp(-j\varphi)]$

$c = w_1 \exp(j2\varphi) - \exp(-j2\varphi)$

$w_1 = \exp(\pi w)$

$v_E = 2\varphi/\pi$

$0 \le u \le 1$

$-v_E \le v \le 2-v_E$

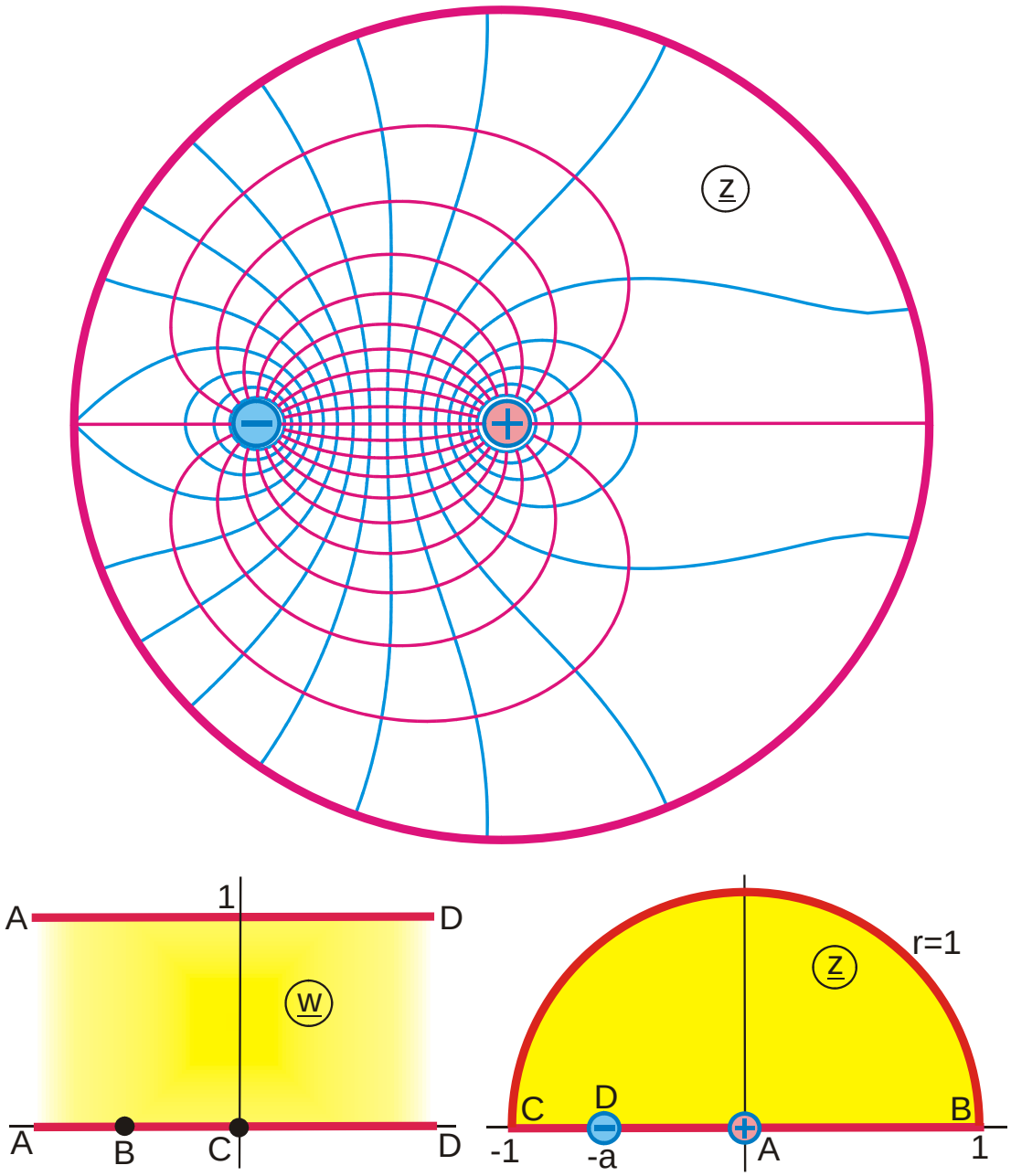


Abbildung T 3.4

$z = -\exp(2w_3)$

$w_3 = ar\tanh w_2$

$w_2 = -\sqrt{\dfrac{w_1 - 1}{b^2 w_1 - 1}}$

$w_1 = \exp(w\pi)$

$b = 1 \Big/ \tanh\dfrac{\ln(1/a)}{2}$

$u_B = -\dfrac{2}{\pi}\ln b$

$-1{,}2 \le u \le 0{,}3$

$0 \le v \le 1$

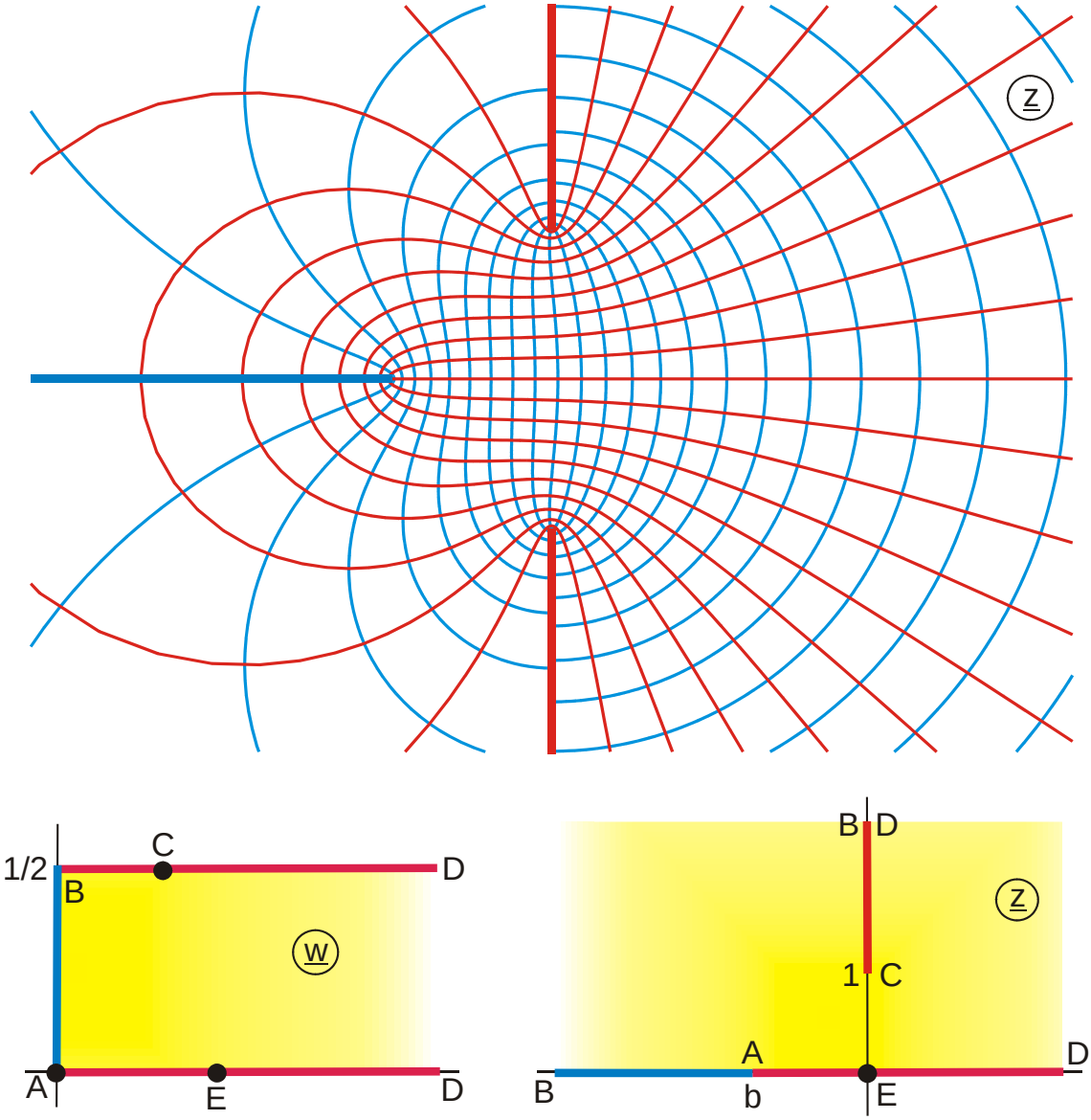


Abbildung T 4

$$z = \frac{1}{2}\left\{ a\cosh(w\pi) - \frac{1}{a\cosh(w\pi)} \right\}$$

$$a = b + \sqrt{1 + b^2}$$

$0 \le u \le 1{,}5$ $\qquad$ $0 \le v \le 0{,}5$

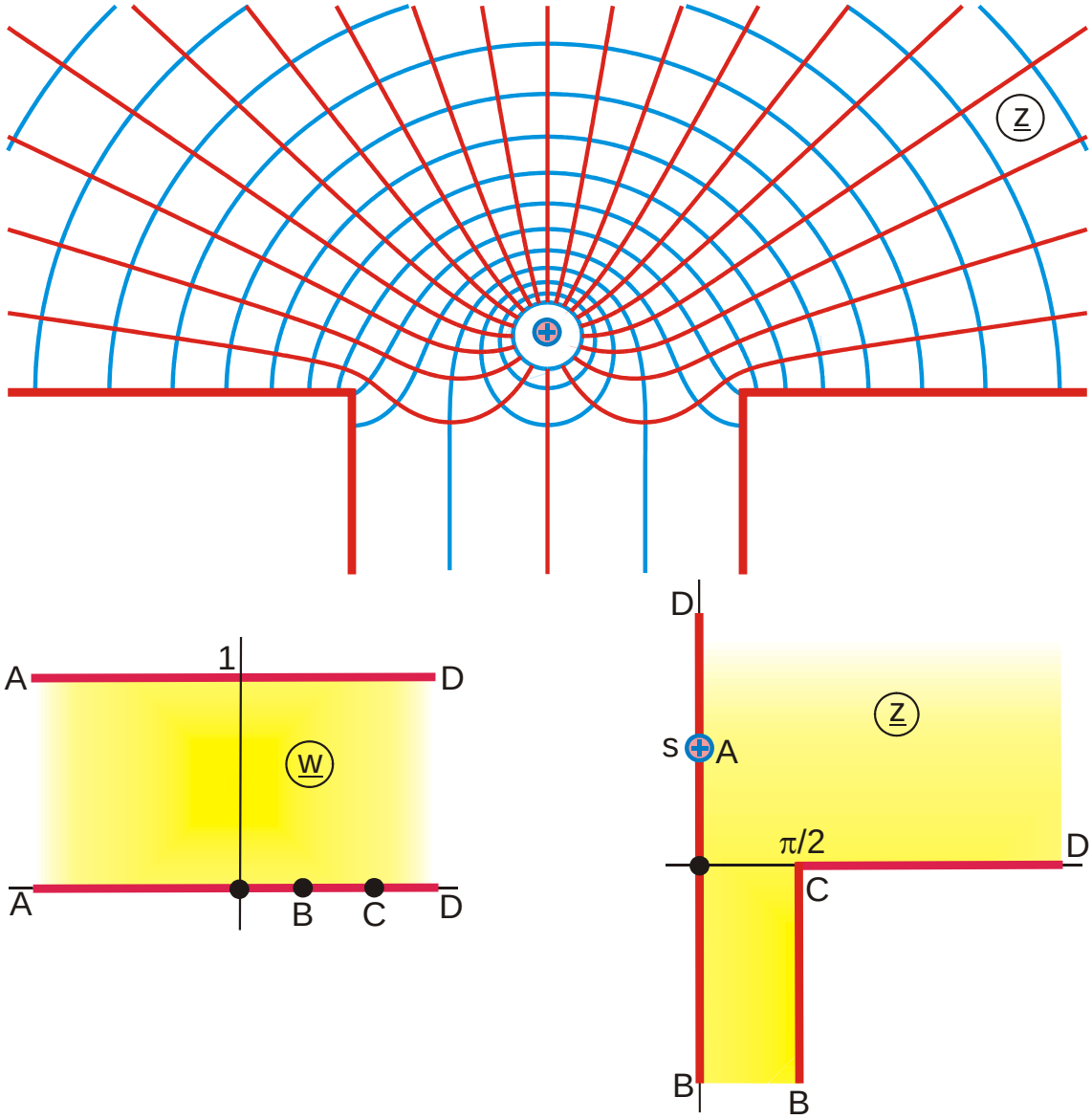


Abbildung T 4.1

$$z = \arctan\sqrt{w_1 - a} - \sqrt{w_1 - a}$$

$$w_1 = \exp(w\pi)$$

$$u_C = \frac{1}{\pi}\ln a$$

$$-0{,}2 \le u \le 1{,}3$$

$$s = \frac{1}{2}\ln\frac{\sqrt{a}-1}{\sqrt{a}+1} + \sqrt{a}$$

$$u_B = \frac{1}{\pi}\ln(a-1)$$

$$0 \le v \le 1$$

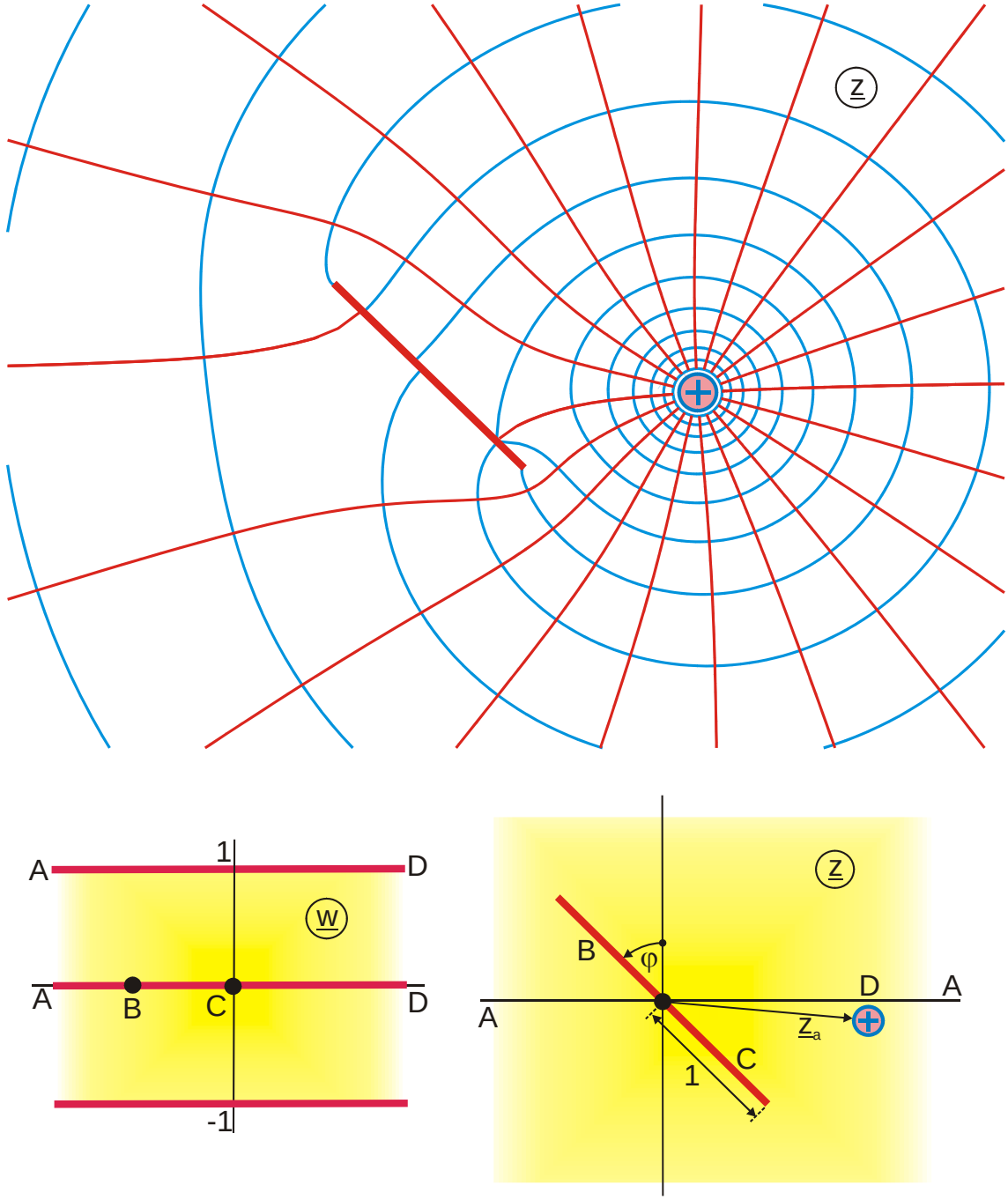


Abbildung T 4.2

$$z = \frac{1}{2}\left(w_4 - \frac{\exp(j2\varphi)}{w_4} \right) \qquad w_4 = \exp(2w_3) \qquad w_3 = ar\tanh w_2$$

$$w_2 = \sqrt{\frac{w_1 - 1}{b^2 w_1 - 1}} \qquad w_1 = \exp(w\pi)$$

$$b = 1 \Big/ \tanh\frac{\ln a}{2} \qquad u_B = -\frac{2}{\pi}\ln b \qquad z_a = \frac{1}{2}\left(a - \frac{\exp(j2\varphi)}{a} \right)$$

$$-0{,}8 \le u \le 0{,}7 \qquad -1 \le v \le 1$$

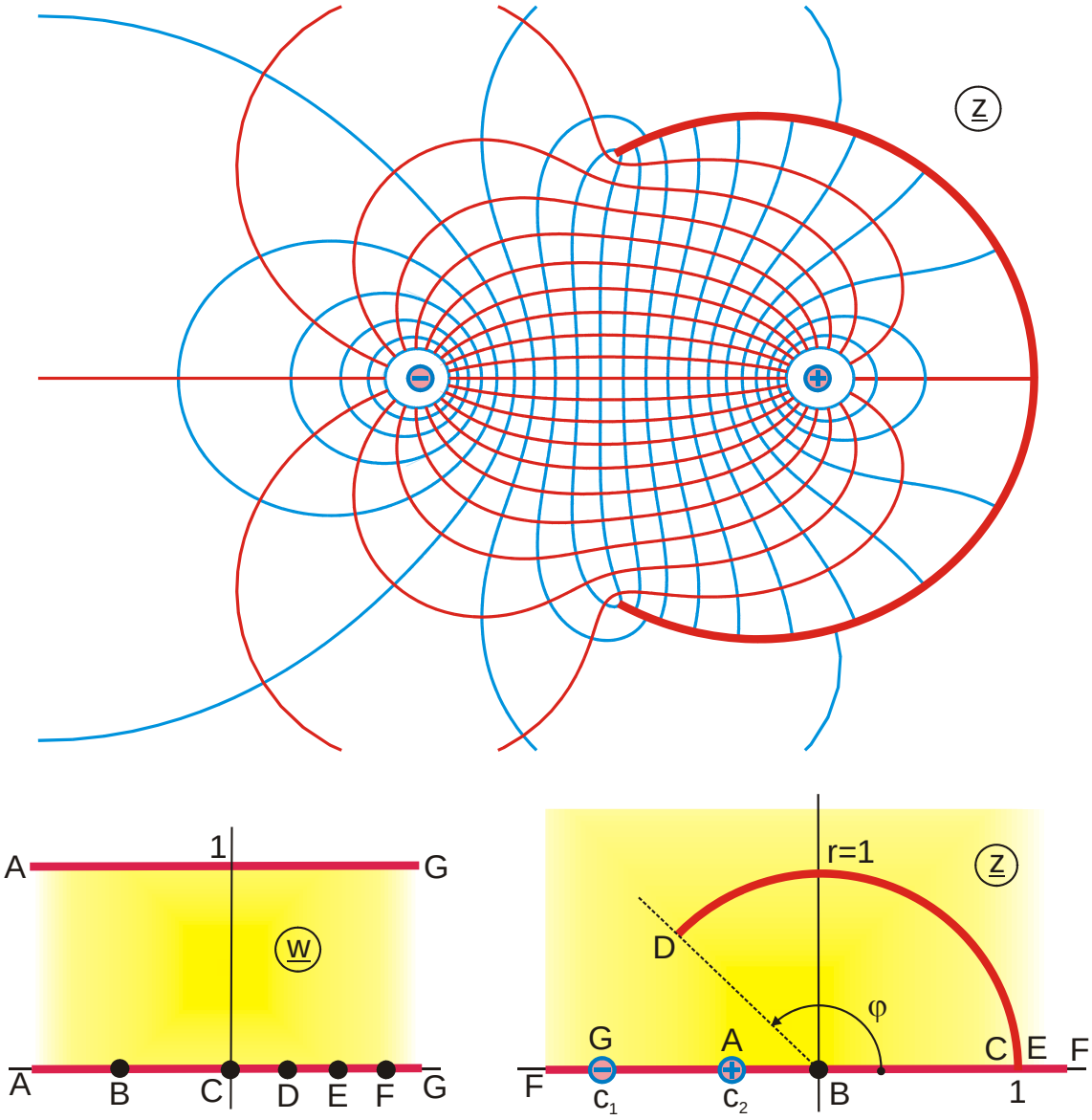


Abbildung T 5

$$z = -\frac{w_3 + j}{w_3 - j}$$

$$w_3 = \frac{-2bw_2}{w_2^2 + 1}$$

$$w_2 = \sqrt{\frac{d_1 - d_2 w_1}{w_1 - 1}}$$

$$w_1 = \exp(w\pi)$$

$$b = 1/\tan(\varphi/2)$$

$$d_1 = a_1^2 \text{ und } d_2 = a_2^2$$

$$a_1 = \frac{b}{b_1} + \sqrt{\frac{b^2}{b_1^2} + 1}$$

$$a_2 = \frac{b}{b_2} + \sqrt{\frac{b^2}{b_2^2} + 1}$$

$$b_1 = (1-c_1)/(1+c_1)$$

$$b_2 = (1-c_2)/(1+c_2)$$

$$-0{,}25 \le u \le 1{,}75$$

$$0 \le v \le 1$$

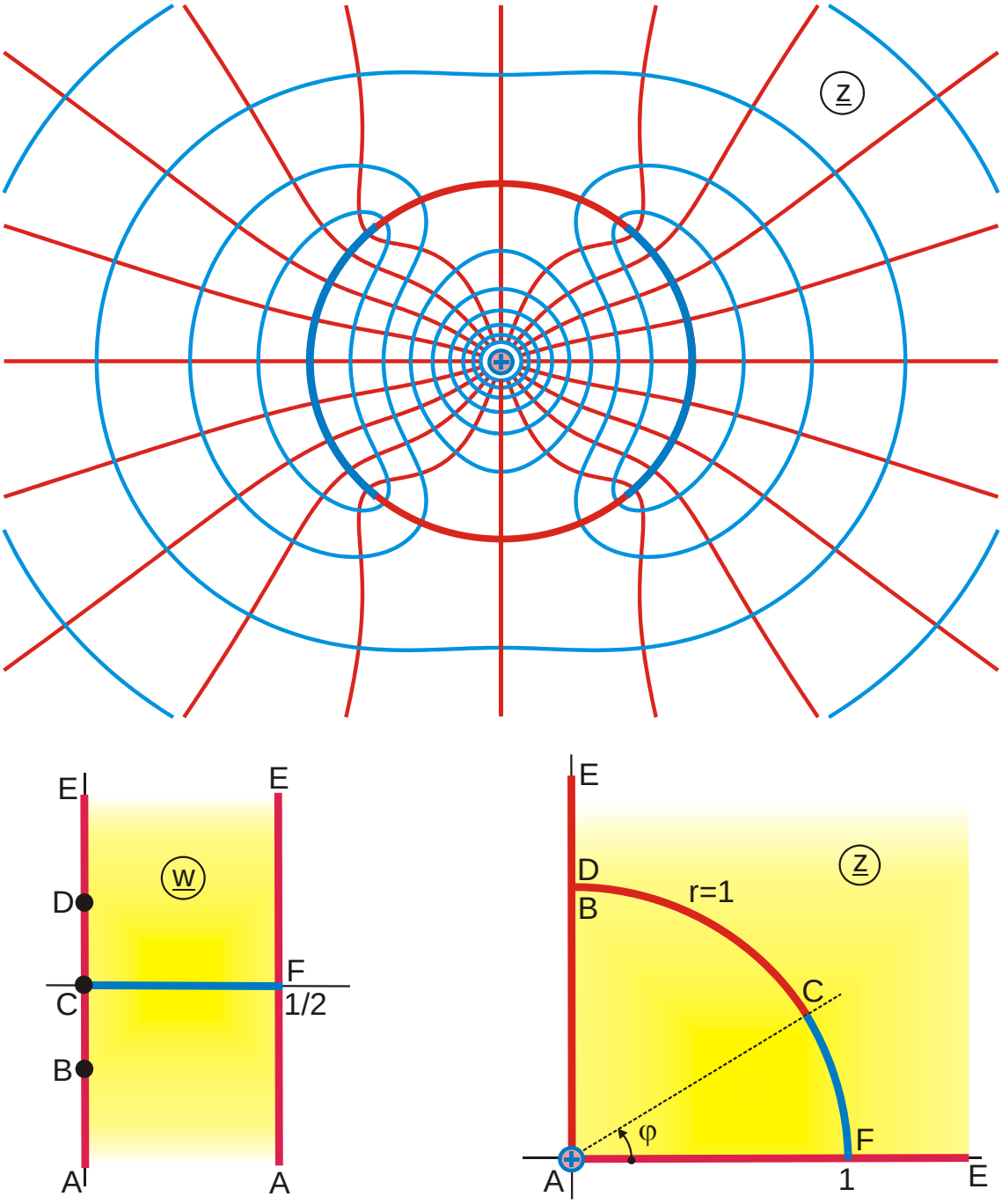


Abbildung T 5.1

$z = \exp(w_1)$

$w_1 = ar\sinh\{j\sigma\cos(w\pi)\}$ $\qquad \sigma = \sin\varphi$

$v_D = \frac{1}{\pi}\,\mathrm{ar}\cosh\frac{1}{\sigma}$ $\qquad v_B = -\,v_D$

$-0{,}8 \le v \le 0{,}7$ $\qquad 0 \le u \le 0{,}5$

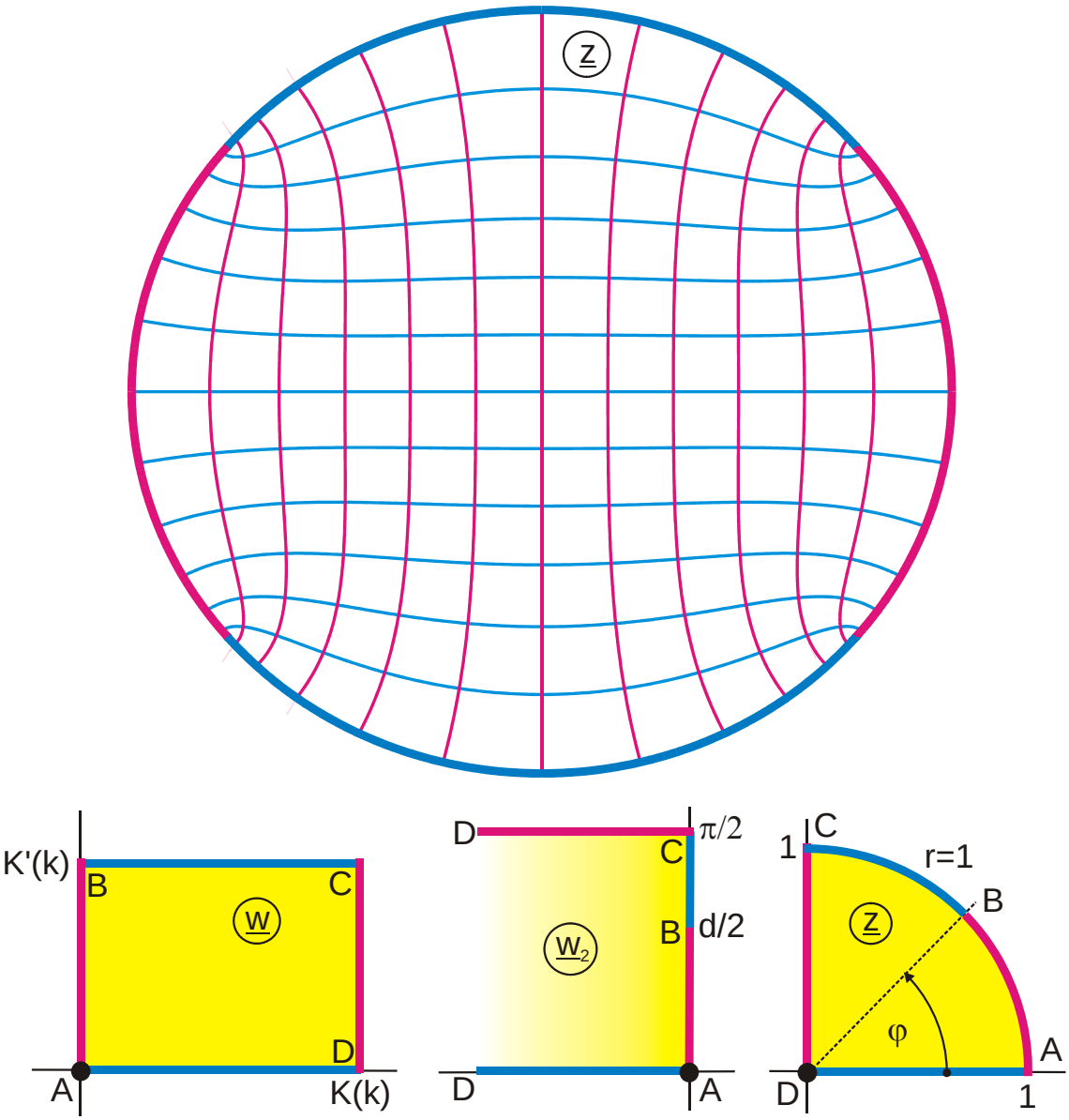


Abbildung T 5.2

$z = \exp(w_2)$ $\qquad$ $w_2 = j \arcsin w_1$

$w_1 = k\,sn(w,k)$ $\qquad$ $k = \sin\varphi$

alternativ : $\quad z = jw_1 + \sqrt{1 - w_1^2}$

$0 \le u \le K(k)$ $\qquad$ $0 \le v \le K'(k)$

Abbildungen Gruppe U

Weitere Abbildungen, spezielle Funktionen

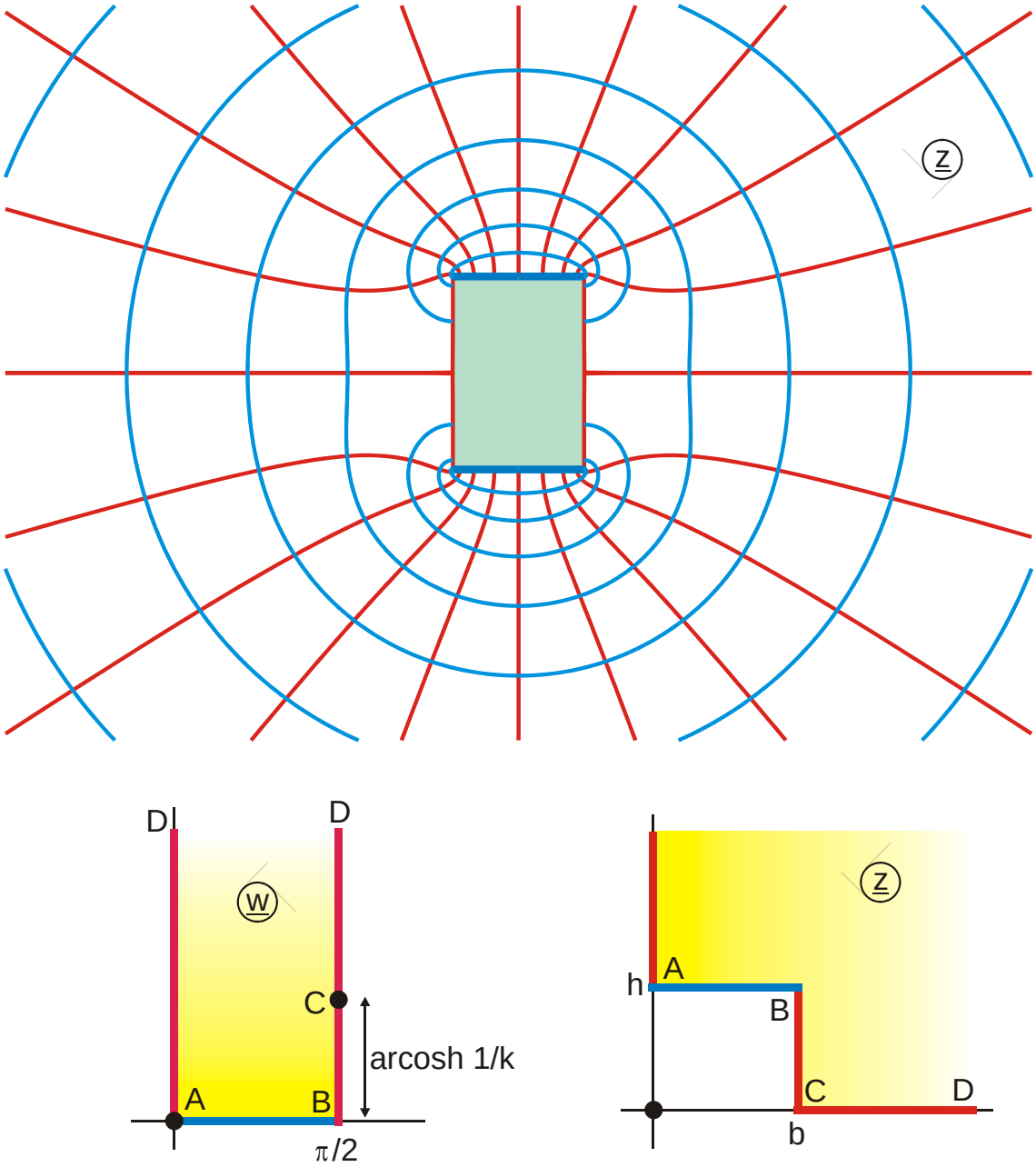


Abbildung U 1

$z = B_t(w,k)+jh$

$$b = \frac{E(k) - k'^2 K(k)}{k^2}$$

$$h = \frac{E'(k)}{k^2} - K'(k)$$

$0 \le u \le \pi/2$

$0 \le v \le \pi$

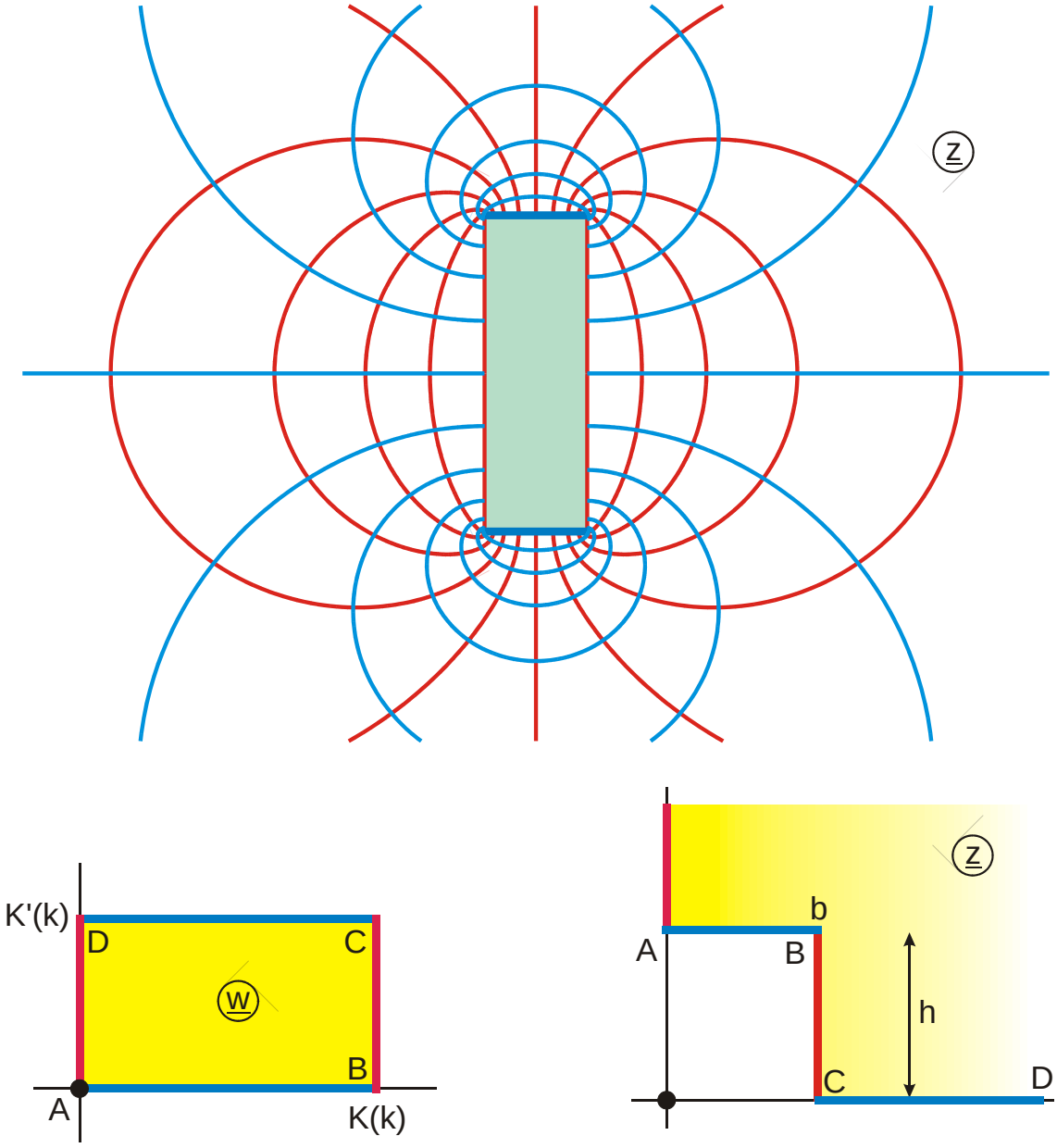


Abbildung U 1.1

$z = B_e(w,k) + jh$

$$b = \frac{E(k) - k'K(k)}{k^2}$$

$$h = \frac{E'(k)}{k^2} - K'(k)$$

$0 \le u \le K(k)$

$0 \le v \le K'(k)$

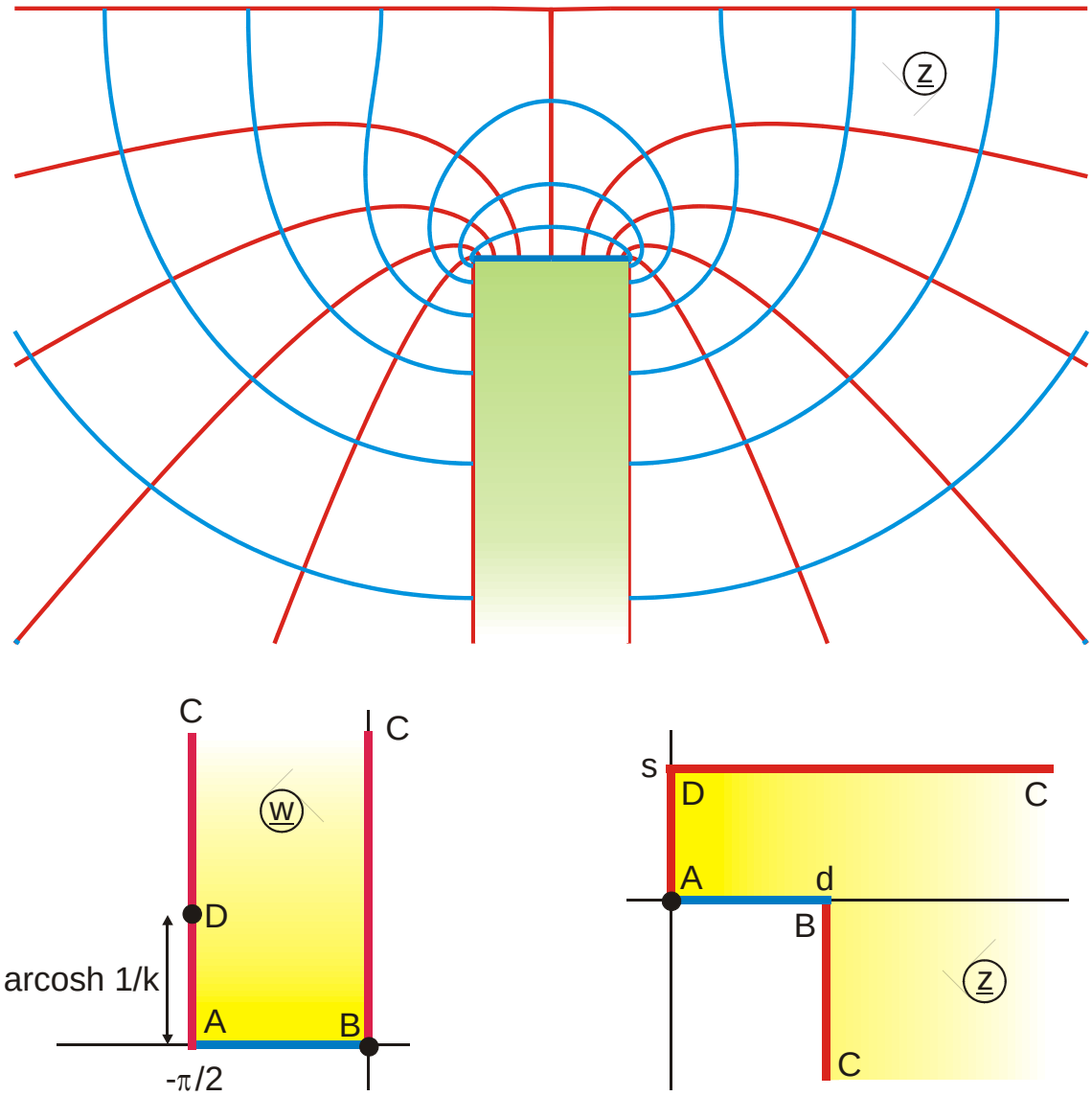


Abbildung U 2

$z = D_t(w,k) + b$

$$d = \frac{K(k) - E(k)}{k^2}$$

$$s = \frac{E'(k)}{k^2}$$

$0 \le u \le -\pi/2$

$0 \le v \le \pi$

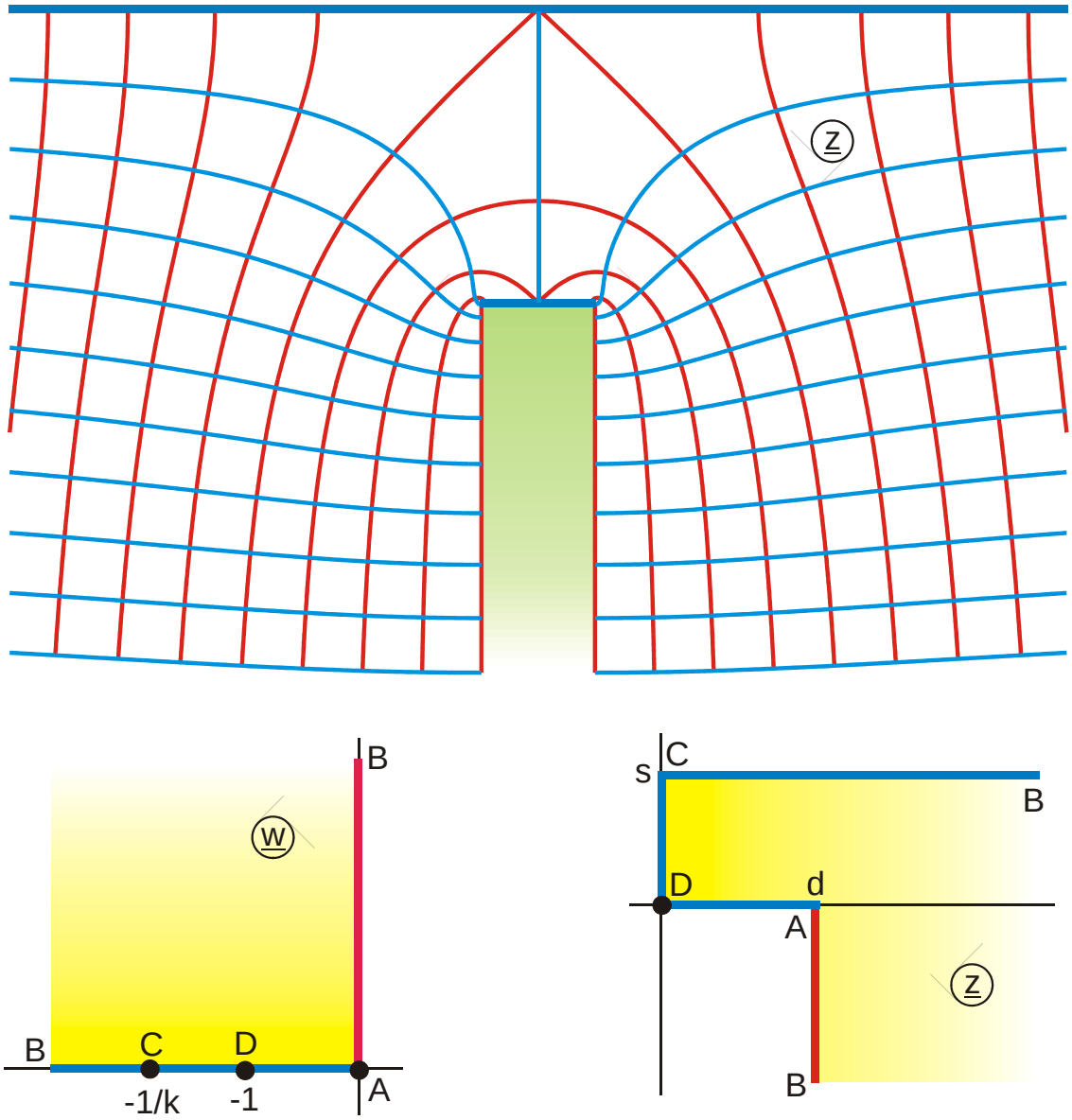


Abbildung U 2.1

$z = D_a(w,k) + b$

$$d = \frac{K(k) - E(k)}{k^2}$$

$$s = \frac{E'(k)}{k^2}$$

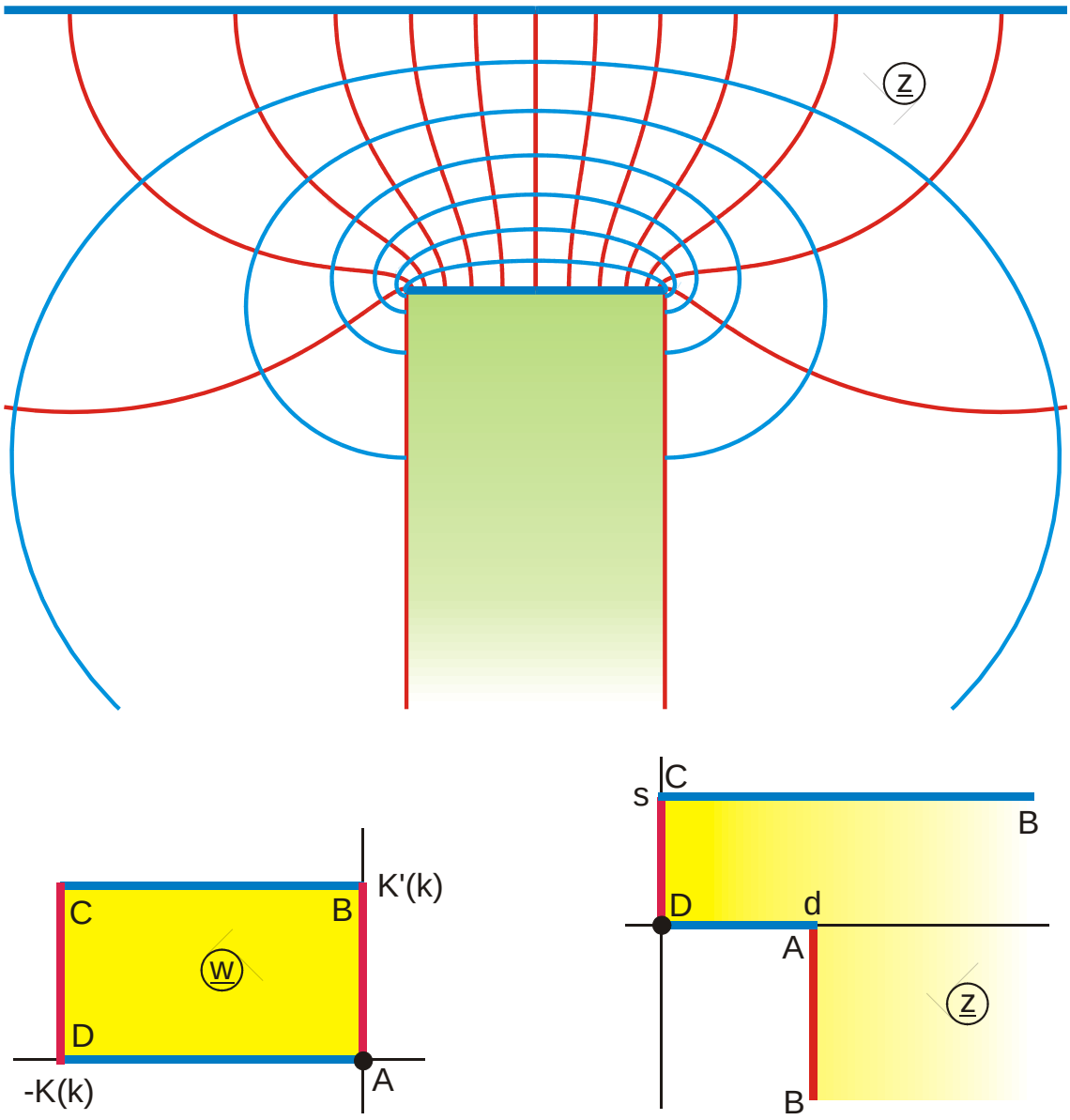


Abbildung U 2.2

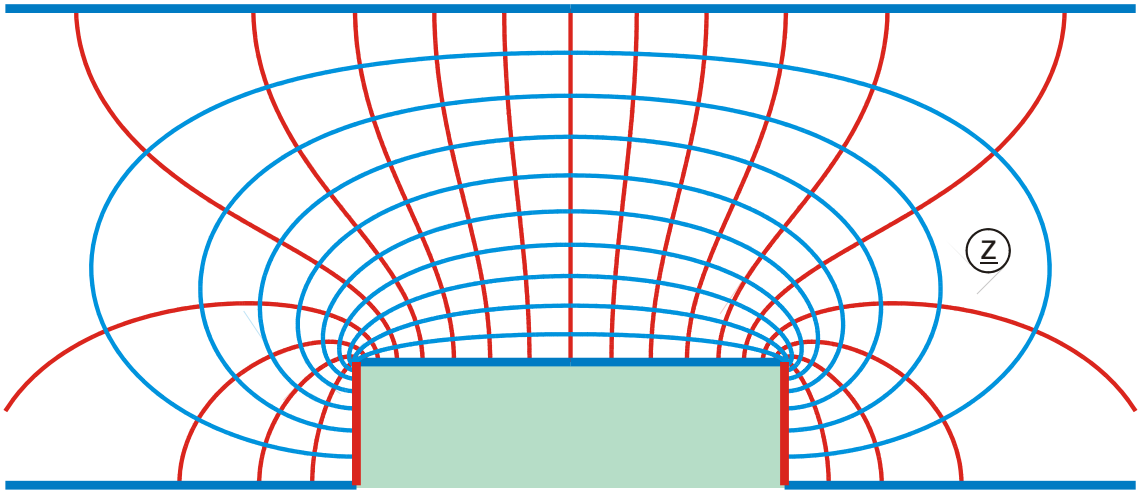
$z = D_e(w,k) + b$

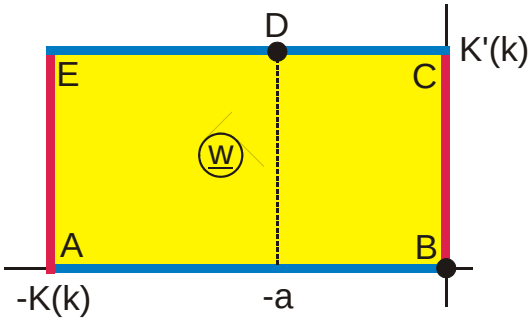
$$d = \frac{K(k) - E(k)}{k^2}$$

$$s = \frac{E'(k)}{k^2}$$

$-K(k) \le u \le 0$

$0 \le v \le K'(k)$





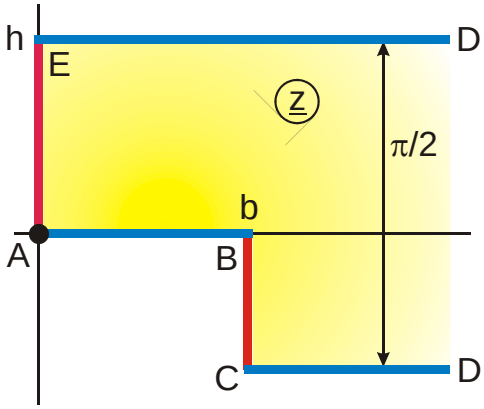


Abbildung U 3

$z = \Pi_j(w,k,a) + b$

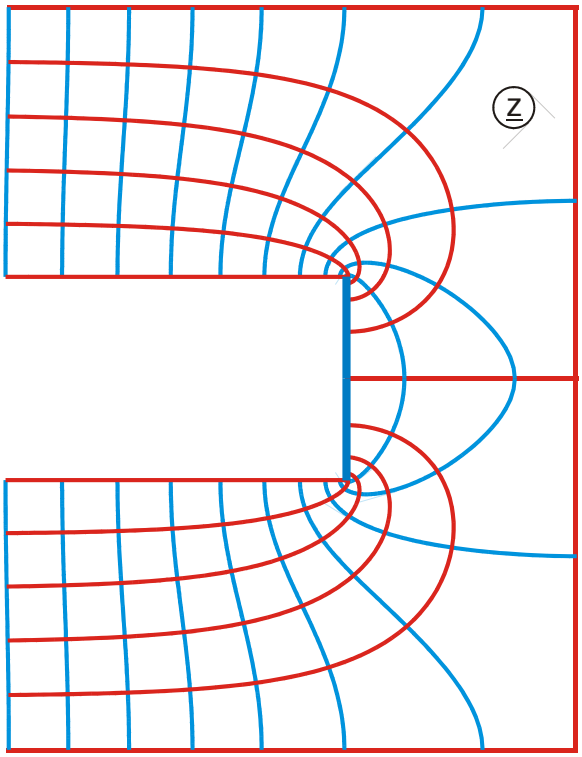
$b = Z_e(a,k)\,K(k)$

$h = K'(k)\,Z_e(a,k) + \frac{\pi a}{2K(k)}$

$-K(k) \le u \le 0$

$0 \le v \le K'(k)$

$u_D = -a$



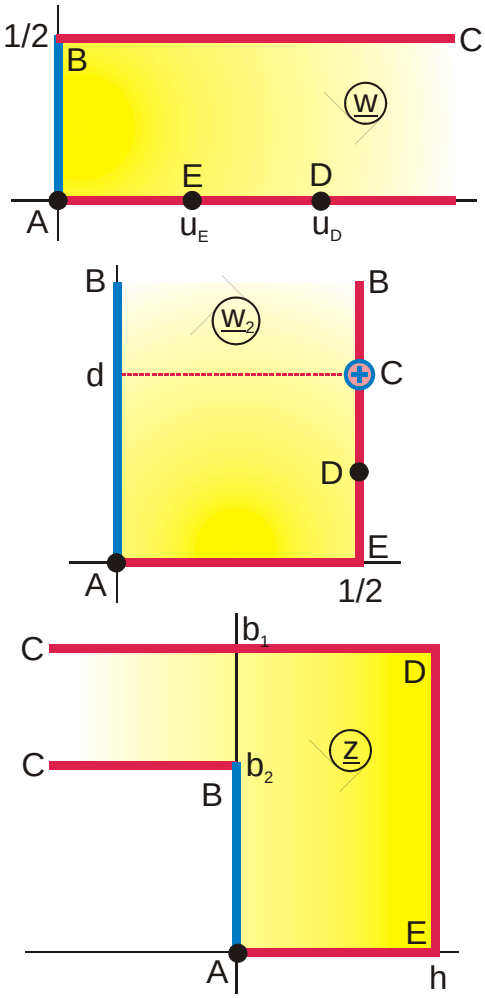


Abbildung U 4

$z = \Pi_t(w_3,k,n)$

$w_3 = \frac{1}{2}\left(\frac{\pi}{2} + \arcsin w_2\right)$

$w_2 = (1+\sigma)w_1 - 1$

$w_1 = \tanh^2(w\pi)$

$Z_e(a,k) = Z_a\left(\frac{\sqrt{n}}{k},k\right)$

$a = F_a\left(\frac{\sqrt{n}}{k},k\right)$

gegeben: k, $0 < n < k^2$

$d = \frac{1}{\pi} ar\cosh\left(1/\sqrt{n}\right)$

$c = \sqrt{\frac{n}{(k^2-n)(1-n)}}$

$h = K(k)\left\{1 + cZ_e(a,k)\right\}$

$b_1 = c\left\{K'(k)Z_e(a,k) + \frac{\pi a}{2K(k)}\right\} + K'(k)$

$\sigma = \cosh(2d) = (2-n)/n$

$b_2 = c\left\{K'(k)Z_e(a,k) + \frac{\pi a}{2K(k)} - \frac{\pi}{2}\right\} + K'(k)$

$u_E = \frac{1}{\pi} ar\tanh\sqrt{\frac{2}{1+\sigma}}$

$0 \le u \le 1$

$0 \le v \le 0{,}5$

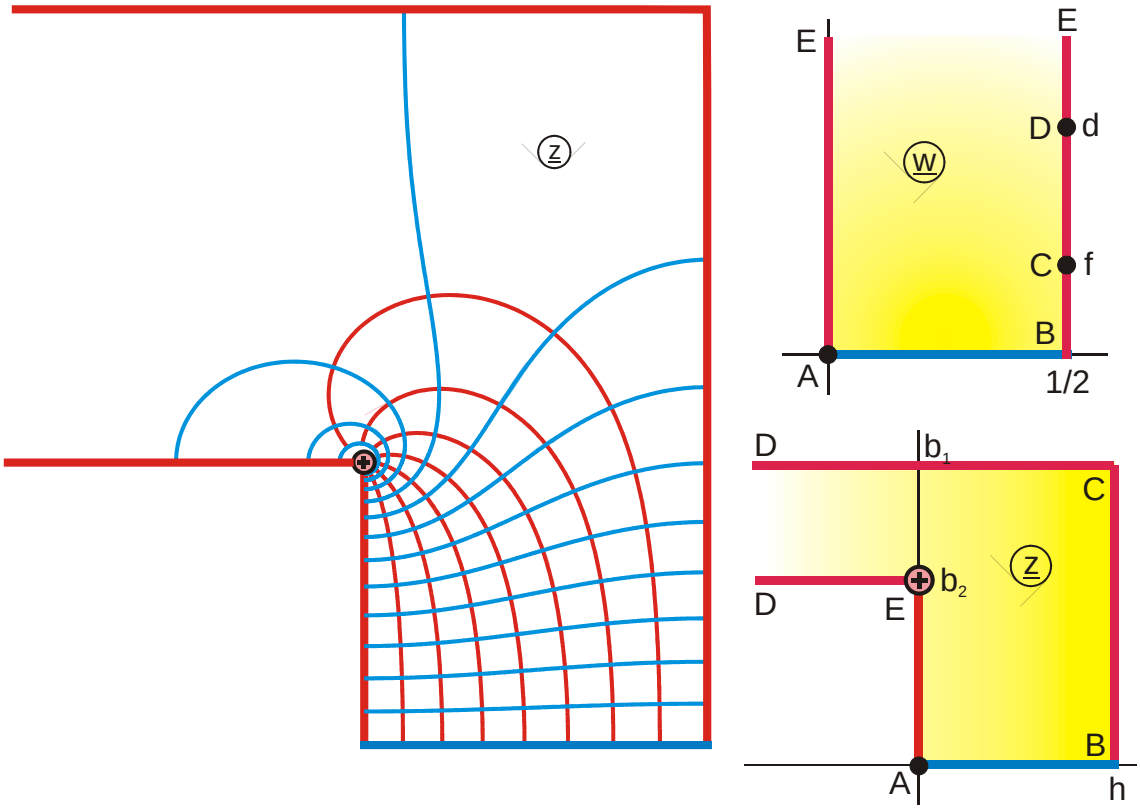


Abbildung U 4.1

$z = \Pi_t(w\pi,k,n)$

$$a = F_a\left(\frac{\sqrt{n}}{k},k\right)$$

gegeben: k, $0 < n < k^2$

$$d = \frac{1}{\pi} ar\cosh\left(1/\sqrt{n}\right)$$

$$c = \sqrt{\frac{n}{(k^2-n)(1-n)}}$$

$$h = K(k)\left\{1 + cZ_e(a,k)\right\}$$

$$b_1 = c\left\{K'(k)Z_e(a,k) + \frac{\pi a}{2K(k)}\right\} + K'(k)$$

$$b_2 = c\left\{K'(k)Z_e(a,k) + \frac{\pi a}{2K(k)} - \frac{\pi}{2}\right\} + K'(k)$$

$$f = \frac{1}{\pi} ar\cosh\frac{1}{k}$$

$0 \le u \le 1/2$

$0 \le v \le 1$

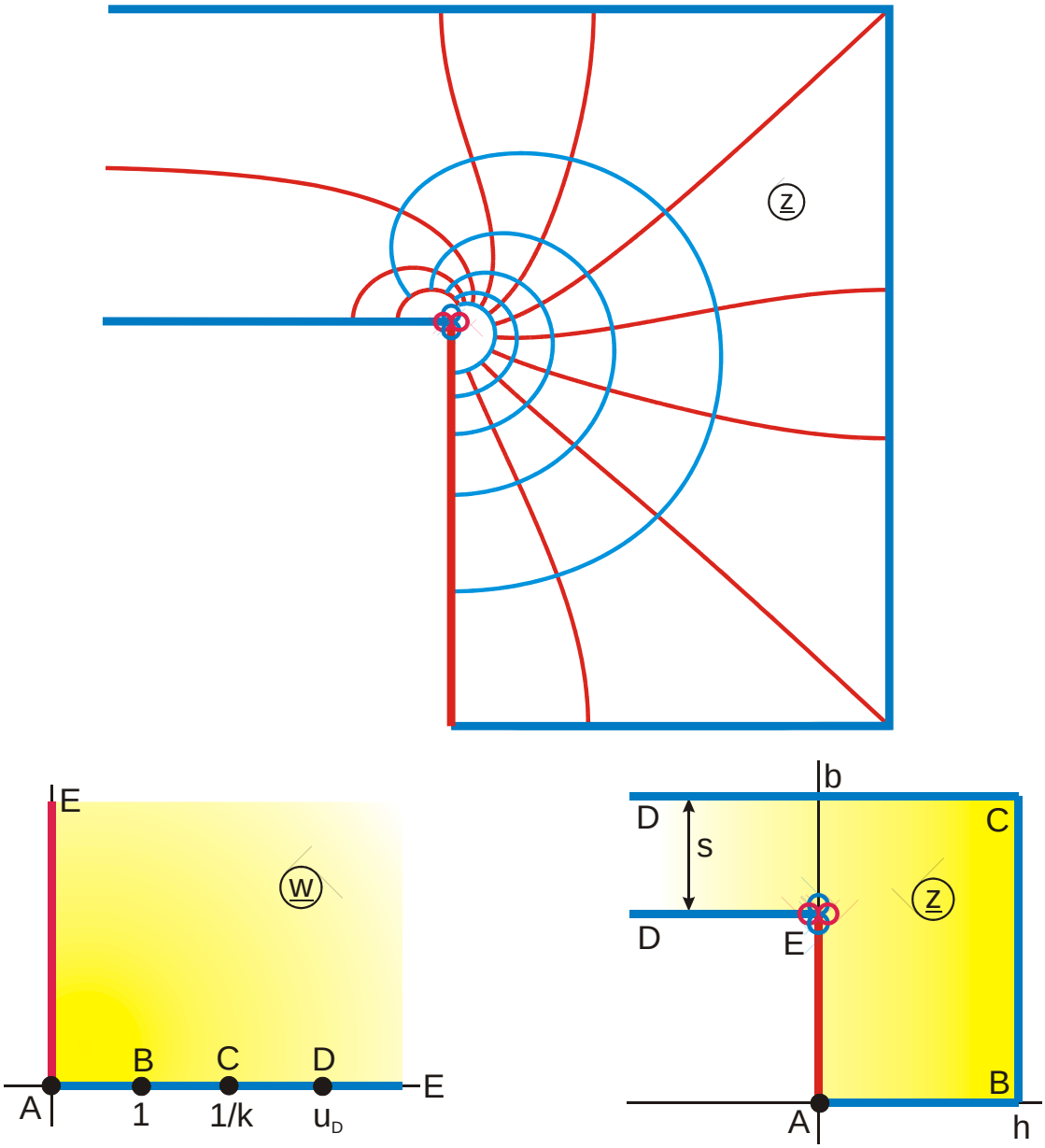


Abbildung U 4.2

$z = \Pi_a(w,k,n)$

$u_D = 1/\sqrt{n}$

$$a = F_a\left(\frac{\sqrt{n}}{k},k\right)$$

$$Z_a\left(\frac{\sqrt{n}}{k},k\right) = Z_e(a,k)$$

gegeben: k, $0 < n < k^2$

$s = c\pi/2$

$$c = \sqrt{\frac{n}{(k^2-n)(1-n)}}$$

$$h = K(k)\left\{1 + cZ_e(a,k)\right\}$$

$$b = c\left\{K'(k)Z_e(a,k) + \frac{\pi a}{2K(k)}\right\} + K'(k)$$

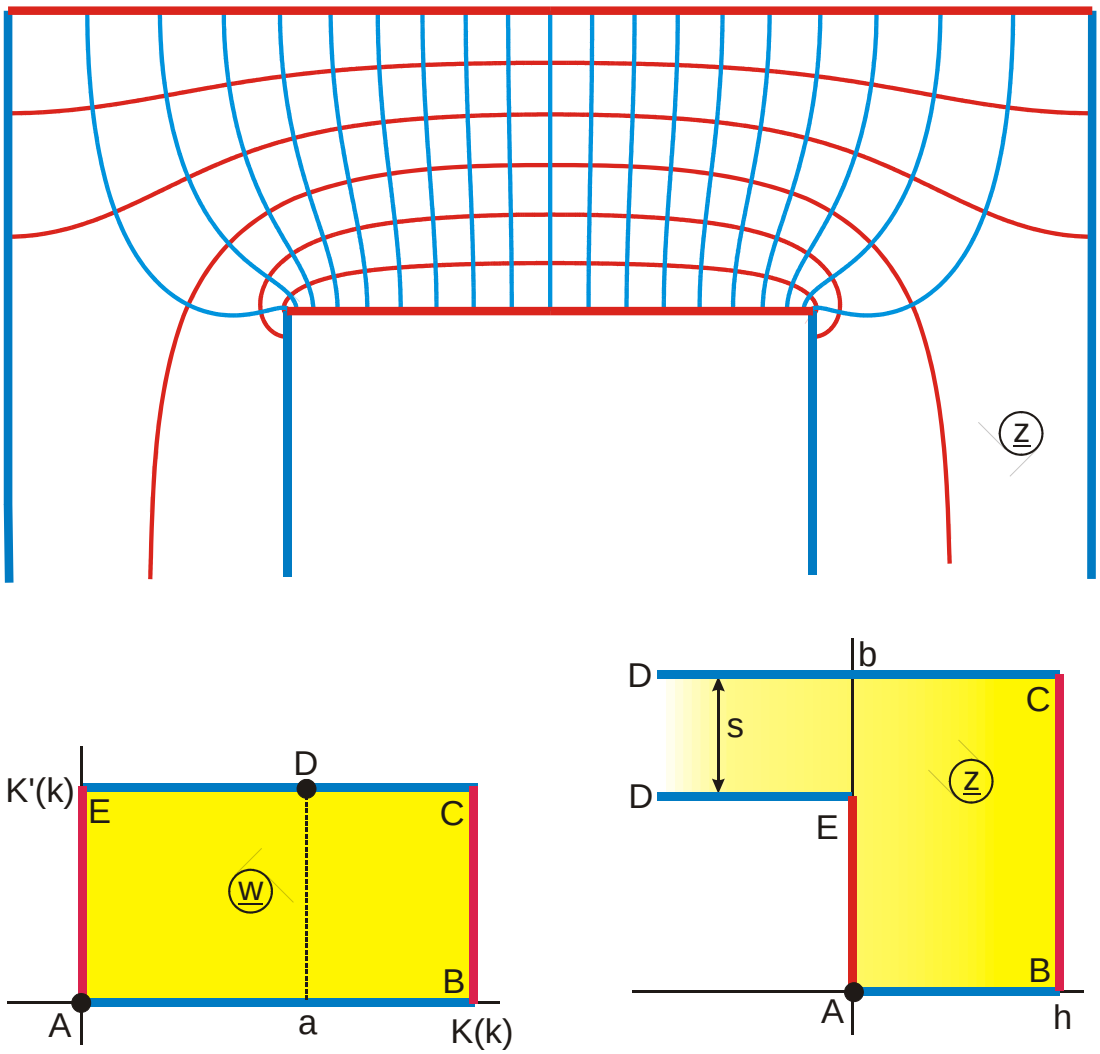


Abbildung U 4.3

$z = \Pi_e(w,k,a)$

$$c = \frac{\mathrm{sn}(a,k)}{\mathrm{cn}(a,k)\,\mathrm{dn}(a,k)}$$

gegeben: k, $0 < a < K(k)$ $\qquad s = c\pi/2$

$$h = K(k)\left\{1 + cZ_e(a,k)\right\} = \Pi(k,a)$$

$$b = c\left\{K'(k)Z_e(a,k) + \frac{\pi a}{2K(k)}\right\} + K'(k)$$

$0 \le u \le K(k)$ $\qquad 0 \le v \le K'(k)$

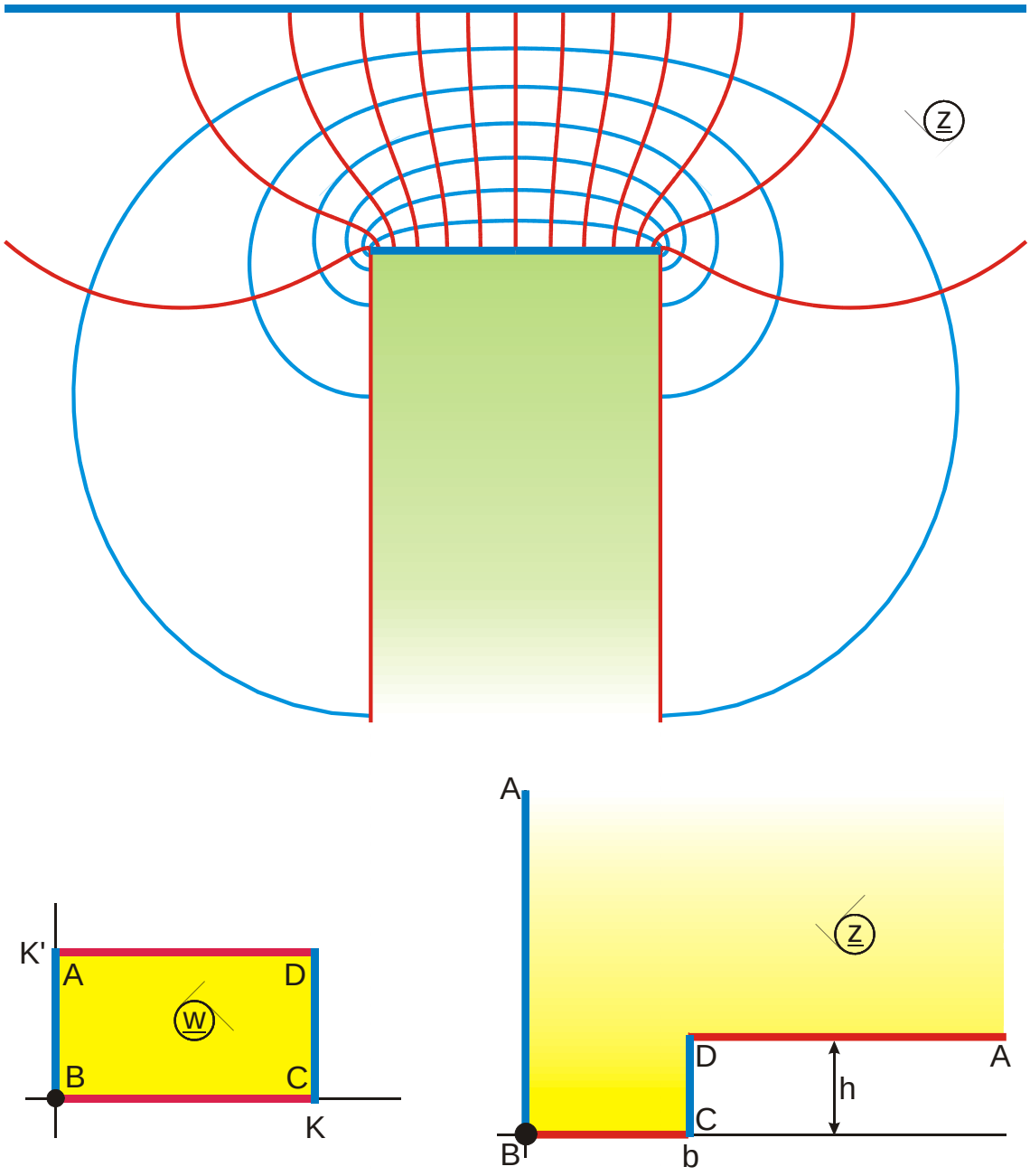


Abbildung U 5

$z = E_e(w,k)$

$b = E(k)$ $\qquad h = K'(k) - E'(k)$

$0 \le u \le K(k)$ $\qquad 0 \le v \le K'(k)$

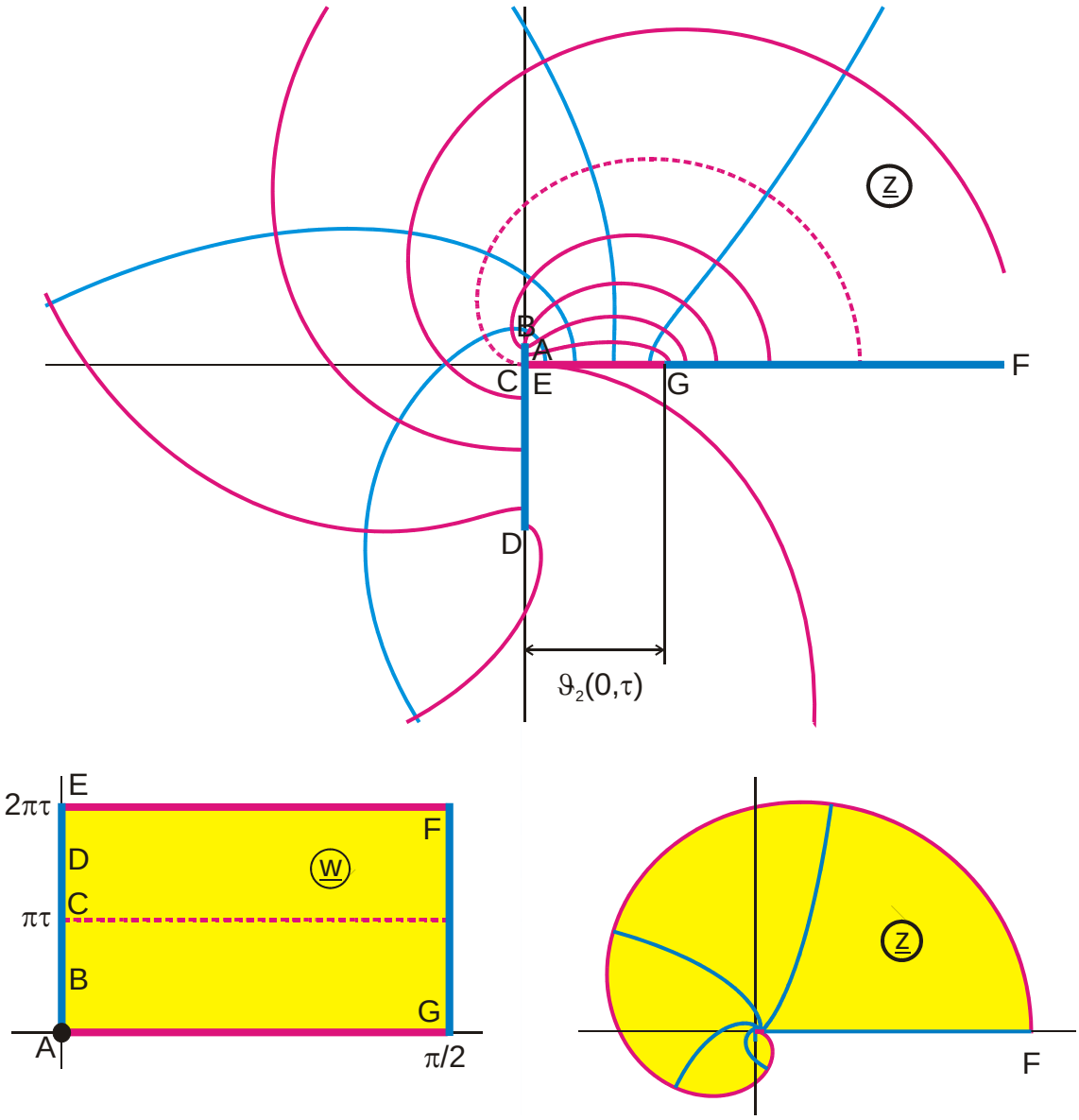


Abbildung U 6.1

$$z = \vartheta_1(w,\tau)$$

$$\vartheta_2(\tau) = \sqrt{\frac{2kK(k)}{\pi}}$$

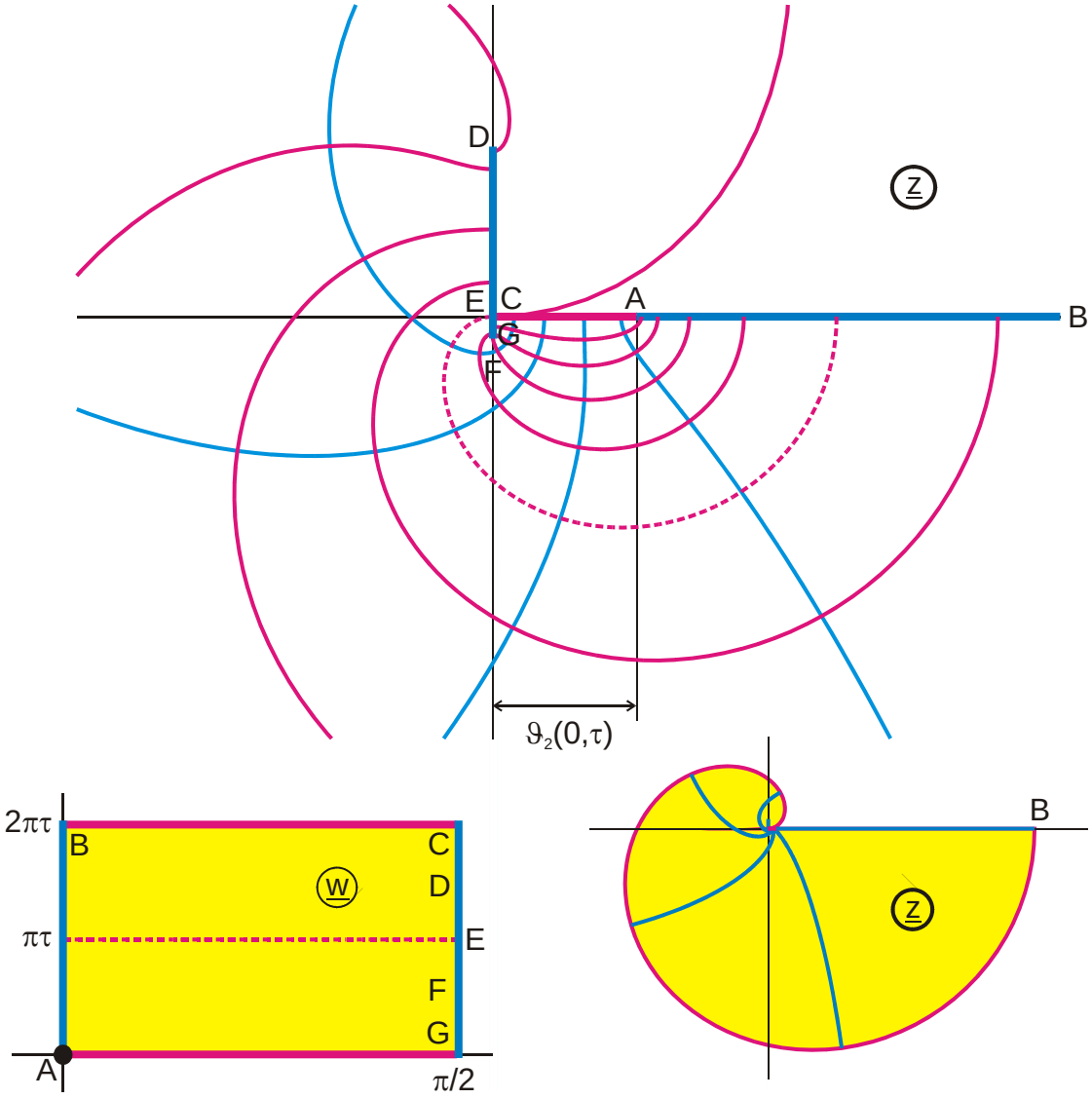


Abbildung U 6.2

$$z = \vartheta_2(w,\tau)$$

$$\vartheta_2(\tau) = \sqrt{\frac{2kK(k)}{\pi}}$$

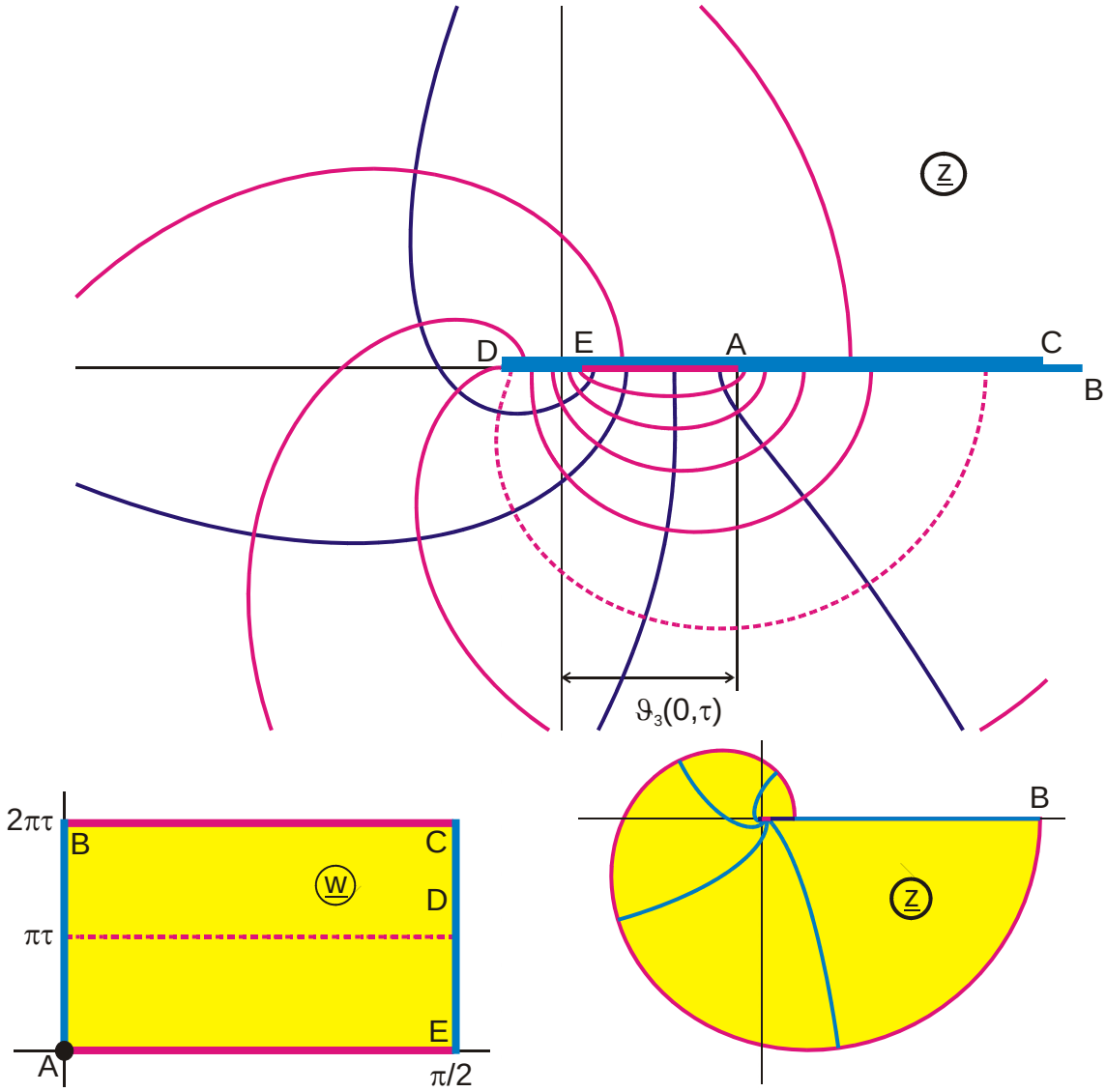


Abbildung U 6.3

$$z = \vartheta_3(w,\tau)$$

$$\vartheta_3(\tau) = \sqrt{\frac{2K(k)}{\pi}}$$

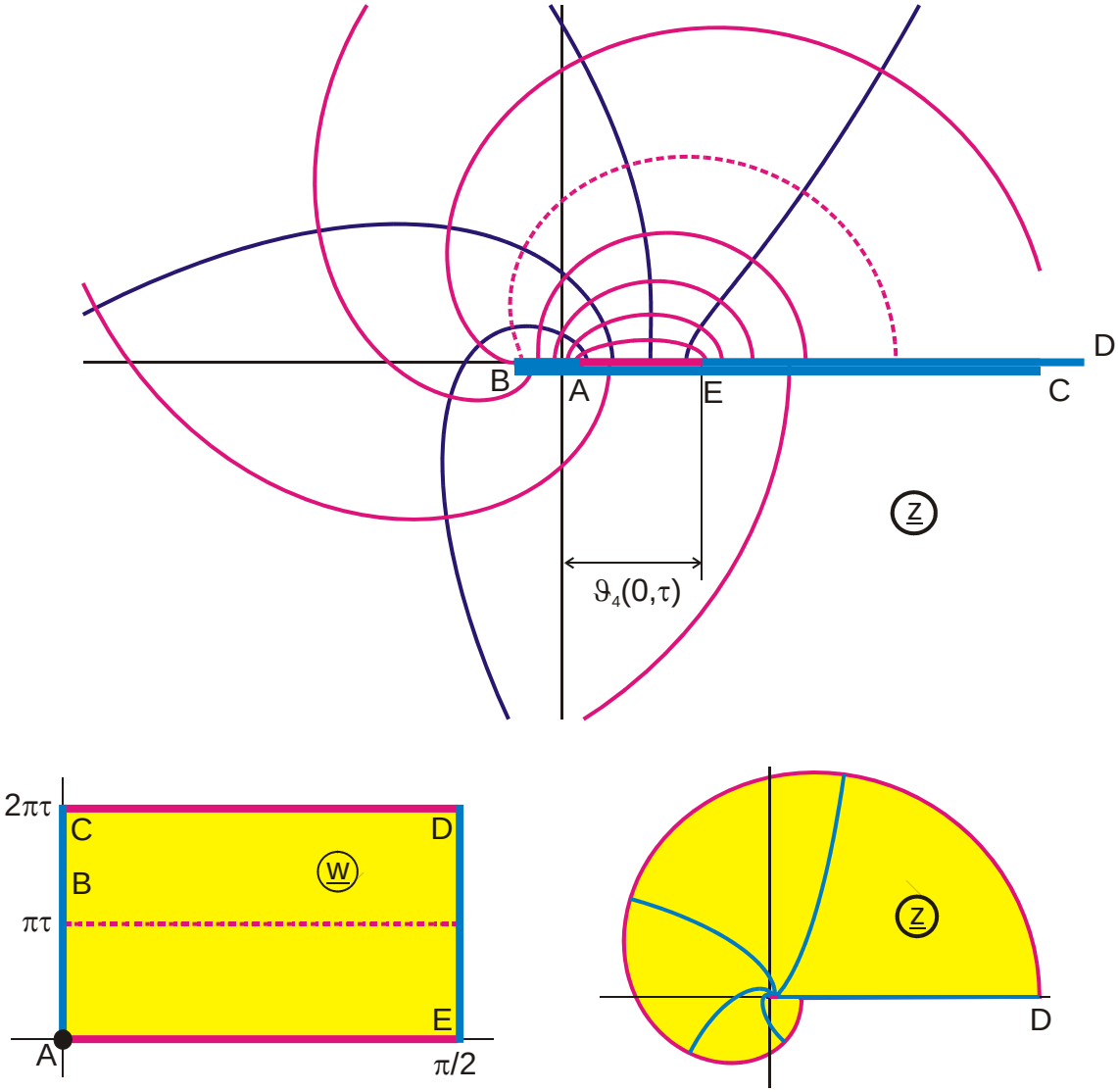


Abbildung U 6.4

$$z = \vartheta_4(w,\tau)$$

$$\vartheta_4(\tau) = \sqrt{\frac{2k'K(k)}{\pi}}$$

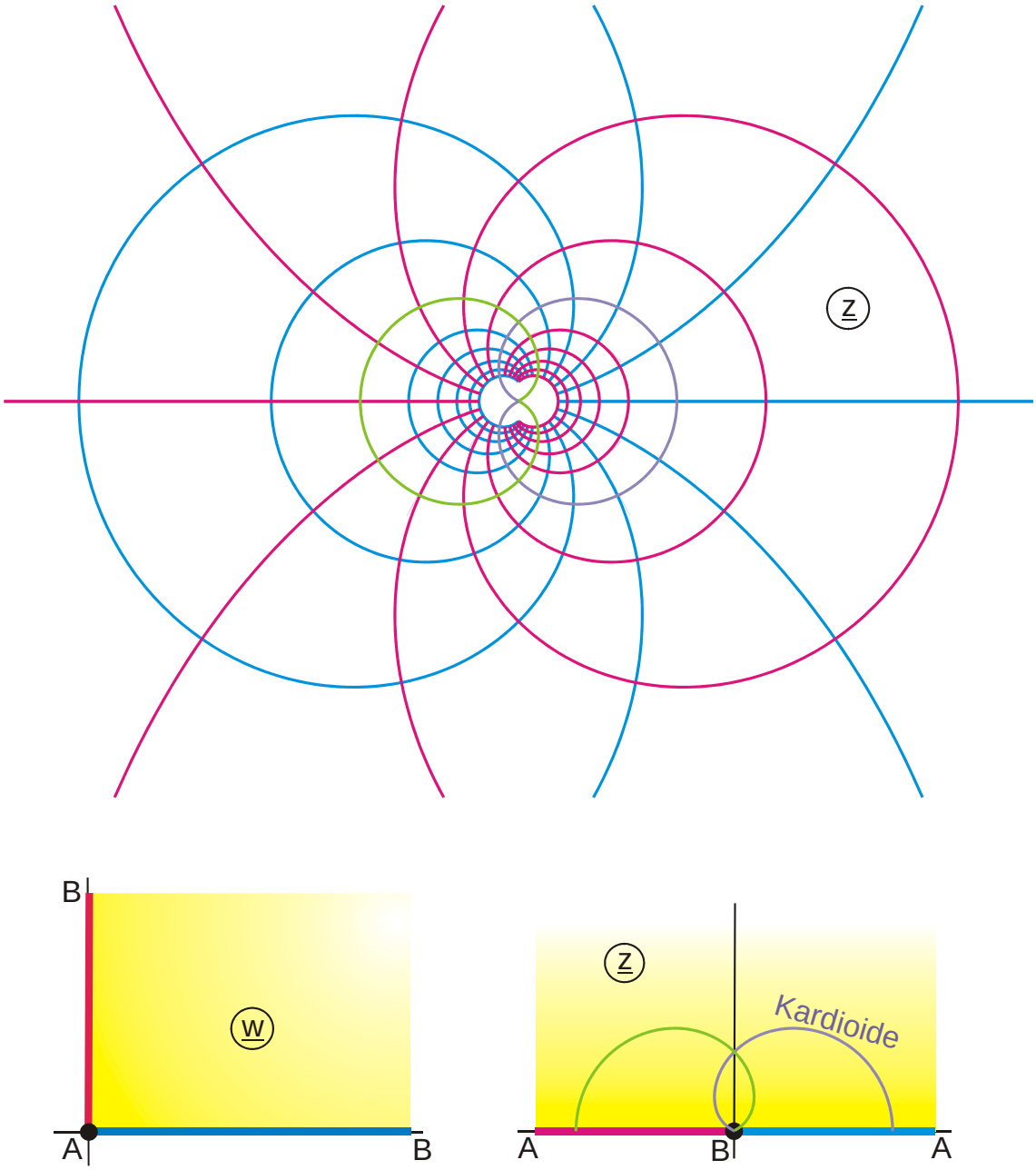


Abbildung U 7 (Kardioiden)

$$z = -\frac{1}{w^2}$$

$0 \le u \le 0{,}5$ $0 \le v \le 0{,}5$

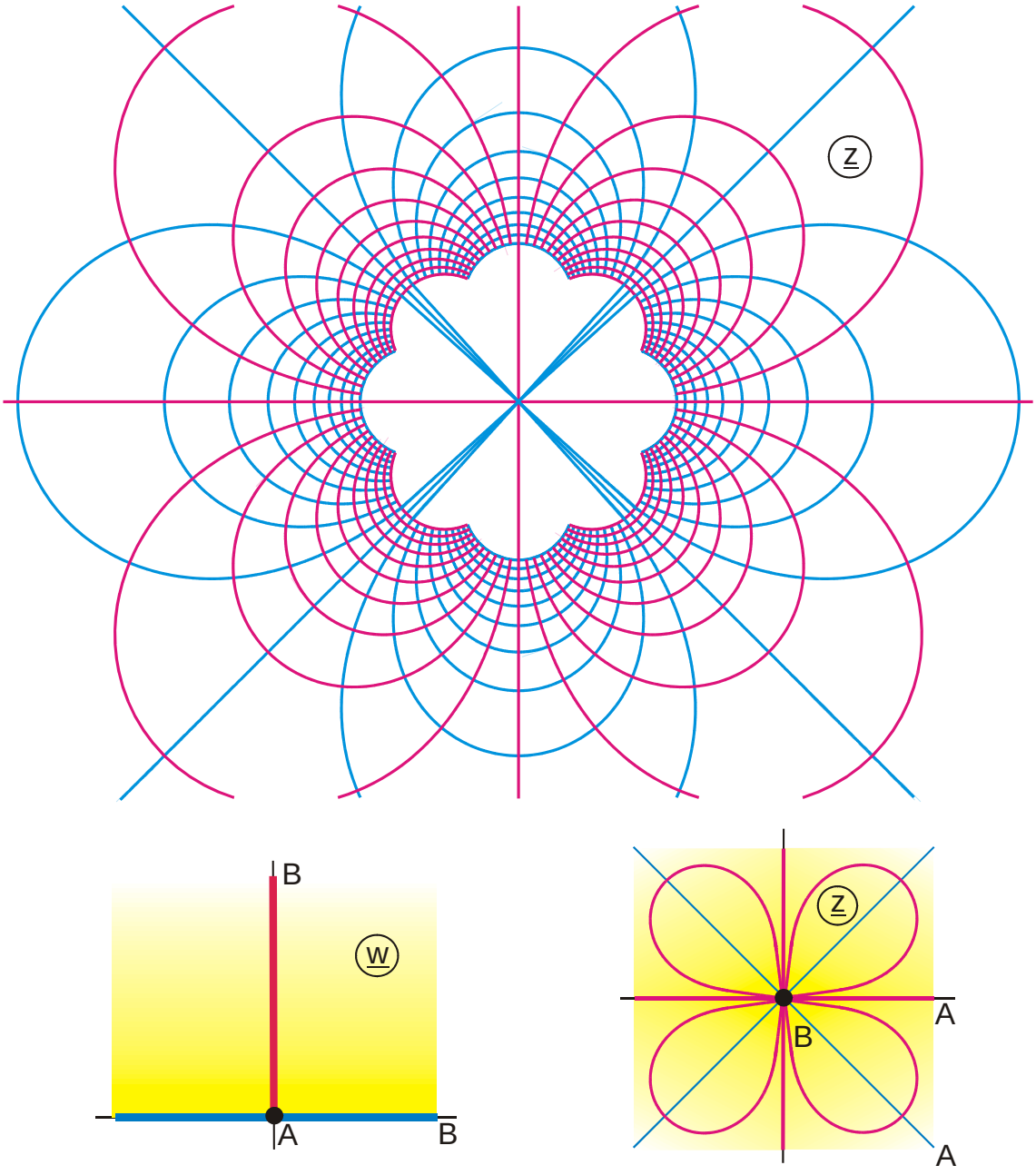
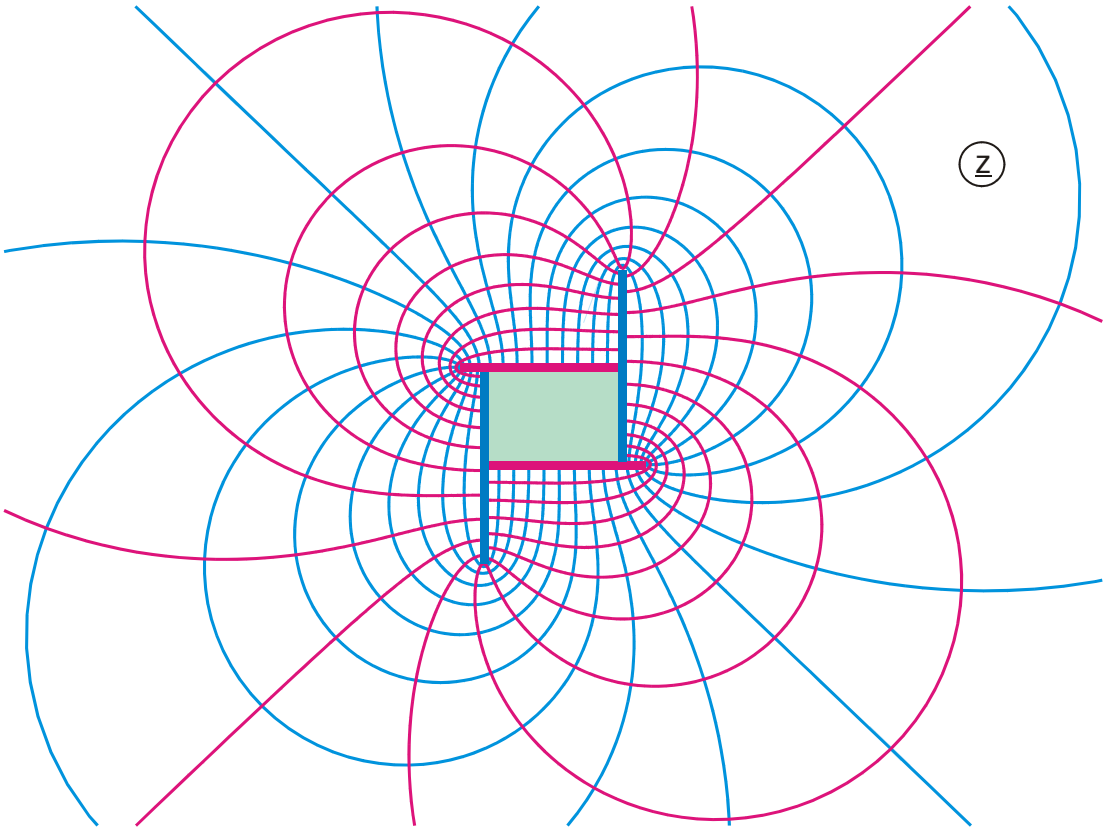
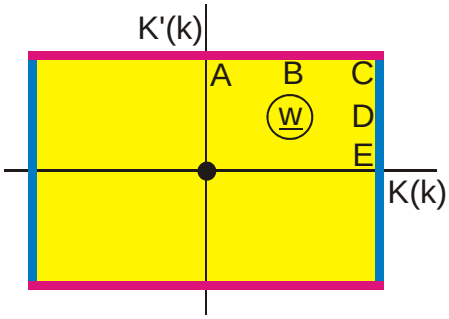


Abbildung U 7.1 (Quadrupol-Feld; 4-leaf roses)

$$z = \frac{1}{\sqrt{w}}$$

$0 \le u \le 0{,}25$ $0 \le v \le 0{,}25$





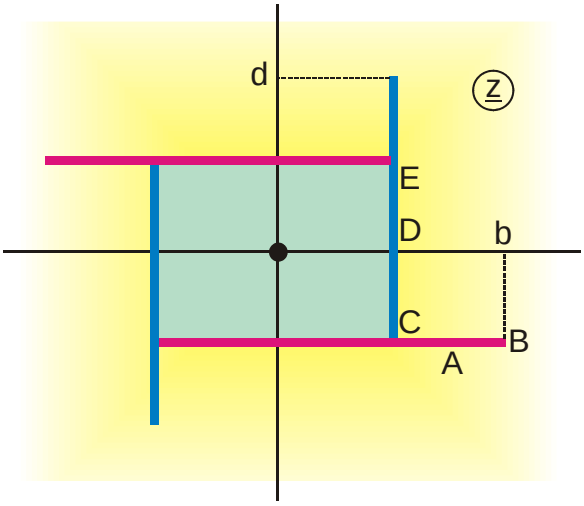


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Abbildung U 7.2 (Windmill für k = 1/sqr(2)

$$z = Z(w,k) + \frac{cn(w,k)\,dn(w,k)}{sn(w,k)} + j\frac{s\,dn(w,k)}{sn(w,k)} + \frac{\pi}{4K^2(k)}w$$

$-K(k) \le u \le K(k)$ $\qquad$ $-K'(k) \le v \le K'(k)$