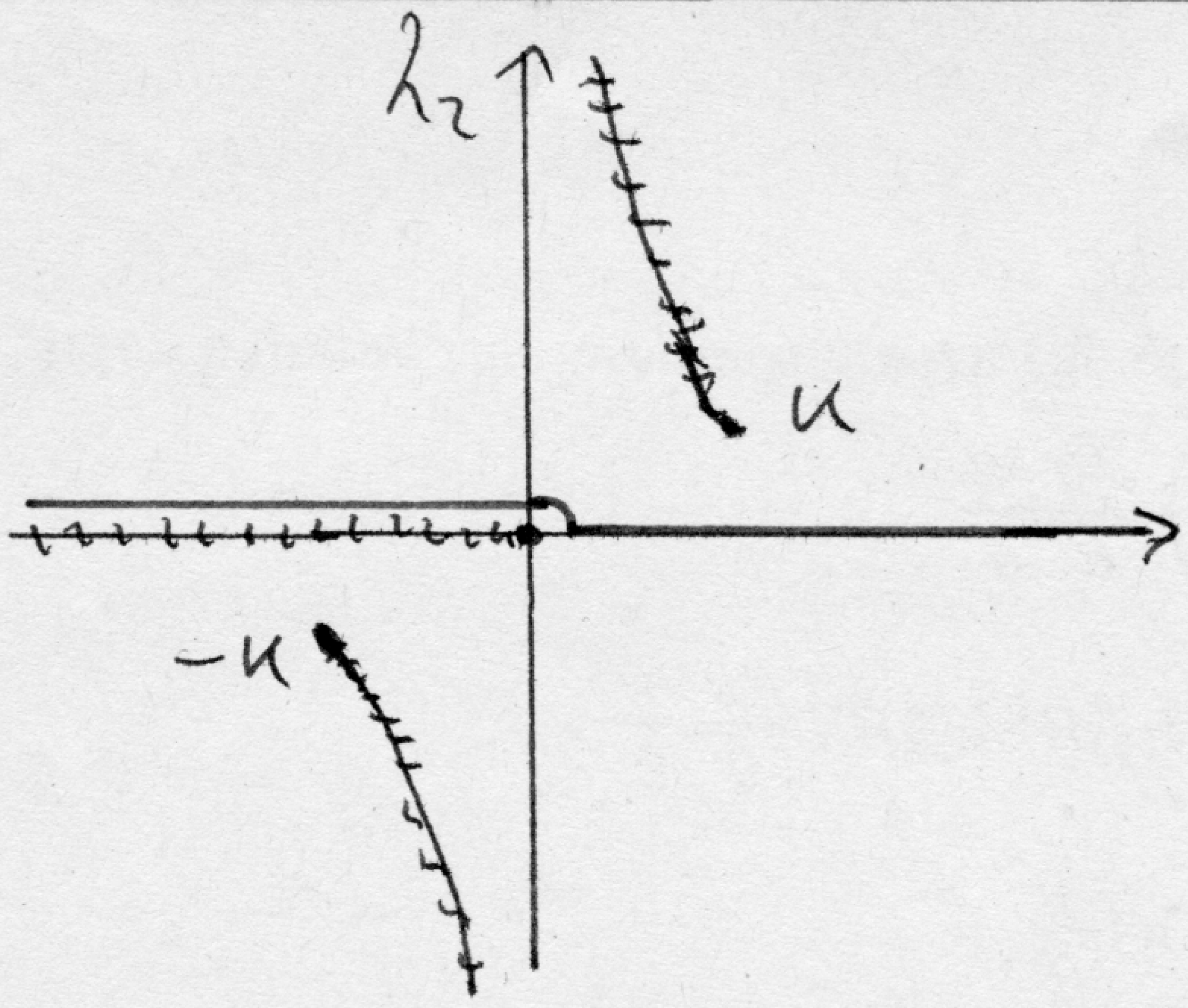
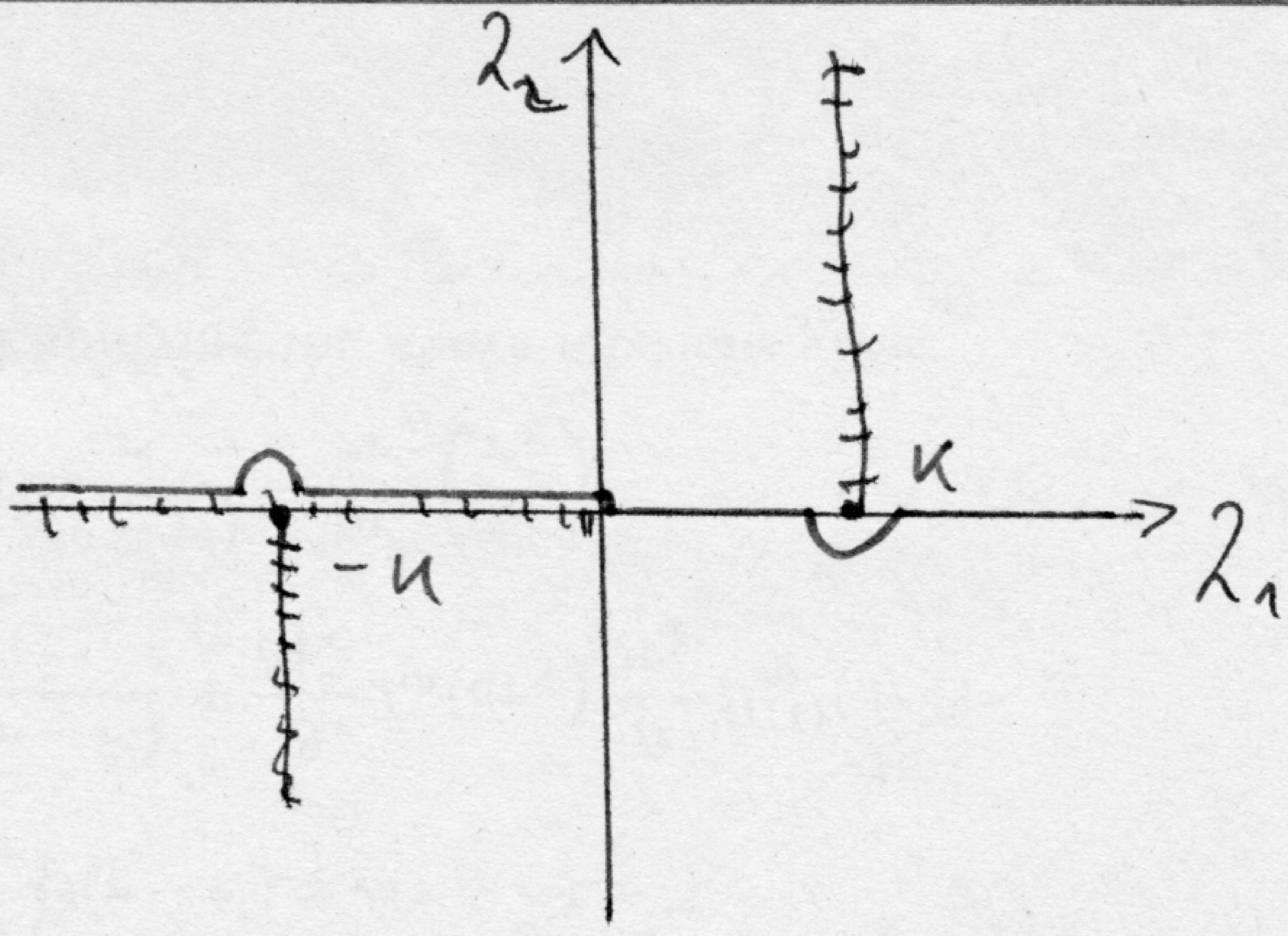
$$\boxed{G(r,\varphi,z;r',\varphi',z') = \frac{i}{8\pi}\sum_{m=-\infty}^{\infty} e^{im(\varphi-\varphi')}\int_{-\infty}^{\infty}\frac{\lambda\,d\lambda}{\sqrt{\kappa^2-\lambda^2}}\, J_m(\lambda r_<)\, H_m^{(1)}(\lambda r_>)\, e^{i|z|\sqrt{\kappa^2-\lambda^2}}}$$





$\lambda < 0:\quad \lambda = t\,e^{i\pi},\quad 0 \le t < \infty.$ $\qquad H_m^{(1)}(t e^{i\pi} r_>) = -e^{-im\pi} H_m^{(2)}(t r_>)$

$d\lambda = dt\, e^{i\pi} = -dt$ $\qquad J_m^{(1)}(t e^{i\pi} r_<) = e^{im\pi} J_m(t r_<)$

$$G_m = \int_{-\infty}^{\infty}\frac{\lambda\,d\lambda}{\sqrt{\kappa^2-\lambda^2}} J_m(\lambda r_<) H_m^{(1)}(\lambda r_>)\, e^{i|z|\sqrt{\kappa^2-\lambda^2}}$$

$$= \int_0^{\infty}\frac{\lambda\,d\lambda}{\sqrt{\kappa^2-\lambda^2}} J_m(\lambda r_<) H_m^{(1)}(\lambda r_>)\, e^{i|z|\sqrt{\kappa^2-\lambda^2}} + \int_{-\infty}^{0}\frac{\lambda\,d\lambda}{\sqrt{\kappa^2-\lambda^2}} J_m(\lambda r_<) H_m^{(1)}(\lambda r_>)\, e^{i|z|\sqrt{\kappa^2-\lambda^2}},$$

$$= \int_0^{\infty}\frac{t\,dt}{\sqrt{\kappa^2-t^2}} J_m(t r_<) H_m^{(1)}(t r_>)\, e^{i|z|\sqrt{\kappa^2-t^2}} + \int_{\infty}^{0}\frac{t\,dt}{\sqrt{\kappa^2-t^2}} \underbrace{J_m(e^{i\pi} t r_<) H_m^{(1)}(e^{i\pi} t r_>)}_{-e^{2im\pi} H_m^{(2)}(t r_>) J_m(t r_<)}\, e^{i|z|\sqrt{\kappa^2-t^2}}$$

$$G_m = \int_0^{\infty}\frac{t\,dt}{\sqrt{\kappa^2-t^2}}\, e^{i|z|\sqrt{\kappa^2-t^2}}\, J_m(t r_<)\underbrace{\left[H_m^{(1)}(t r_>) + H_m^{(2)}(t r_>)\right]}_{2 J_m(t r_>)}$$

$$= 2\int_0^{\infty}\frac{t\,dt}{\sqrt{\kappa^2-t^2}}\, e^{i|z|\sqrt{\kappa^2-t^2}}\, J_m(t r_<) J_m(t r_>)$$

$$\boxed{G(r,\varphi,z;r',\varphi',z') = \frac{i}{4\pi}\sum_{m=-\infty}^{\infty} e^{im(\varphi-\varphi')}\int_0^{\infty}\frac{\lambda\,d\lambda}{\sqrt{\kappa^2-\lambda^2}}\, J_m(\lambda r) J_m(\lambda r')\, e^{i|z-z'|\sqrt{\kappa^2-\lambda^2}} \qquad \operatorname{Im}\left(\sqrt{\kappa^2-\lambda^2}\right) \ge 0.}$$

$r'=0,\ z'=0:\quad J_0(\lambda r') = 1,\ J_m(\lambda r') = 0,\ m \ne 0.\qquad G = \frac{1}{4\pi R} e^{i\kappa R} = \frac{1}{4\pi} e^{i\kappa\sqrt{r^2+z^2}}/\sqrt{r^2+z^2}$

$$\frac{e^{i\kappa\sqrt{r^2+z^2}}}{\sqrt{r^2+z^2}} = i\int_0^{\infty}\frac{\lambda\,d\lambda}{\sqrt{\kappa^2-\lambda^2}}\, J_0(\lambda r)\, e^{i|z|\sqrt{\kappa^2-\lambda^2}} \qquad \text{Formel von Sommerfeld}$$

$$= \frac{i}{2}\int_{-\infty}^{\infty}\frac{\lambda\,d\lambda}{\sqrt{\kappa^2-\lambda^2}}\, H_0^{(1)}(\lambda r)\, e^{i|z|\sqrt{\kappa^2-\lambda^2}}$$

$$= \frac{i}{2}\int_{-\infty}^{\infty} d\zeta\, e^{i\zeta z}\, H_0^{(1)}\left(r\sqrt{\kappa^2-\zeta^2}\right) \qquad \text{Formel von Weyrich}$$