$$\Delta G + k^2 G = -\delta(\vec{r} - \vec{r}\,') \qquad e^{-i\omega t}$$

$$k = k_1 + i k_2 \,, \qquad k_1 \geq k_2 \geq 0 .$$

RB Ausstrahlungsbedingung im Unendlichen.

$$\left[\frac{\partial^2}{\partial r^2} + \frac{1}{r}\frac{\partial}{\partial r} + \frac{1}{r^2}\frac{\partial^2}{\partial \varphi^2} + \frac{\partial^2}{\partial z^2} + k^2\right] G(r,\varphi,z;r',\varphi',z') = -\frac{\delta(r-r')}{r}\,\delta(\varphi-\varphi')\,\delta(z-z')$$

$$\delta(\varphi-\varphi') = \frac{1}{2\pi}\sum_{m=-\infty}^{\infty} e^{im(\varphi-\varphi')}$$

$$\frac{\delta(r-r')}{r} = \int_0^\infty J_m(\lambda r)\, J_m(\lambda r')\,\lambda\, d\lambda$$

$$G(r,\varphi,z;r',\varphi',z') = \frac{1}{2\pi}\sum_{m=-\infty}^{\infty} e^{im(\varphi-\varphi')}\int_0^\infty J_m(\lambda r)\, J_m(\lambda r')\, g_m(z,z';\lambda)\,\lambda\, d\lambda$$

$$\left[\frac{d^2}{dr^2} + \frac{1}{r}\frac{d}{dr} + \lambda^2 - \frac{m^2}{r^2}\right] J_m(\lambda r) = 0$$

$$\left(\frac{d^2}{dz^2} + \underbrace{k^2-\lambda^2}_{\zeta^2}\right) g_m(z,z';\lambda) = -\delta(z-z')$$

$\zeta^2 = k^2 - \lambda^2 \,; \qquad \zeta = \zeta_1 + i\zeta_2 = \sqrt{k^2-\lambda^2}\,, \qquad \mathrm{Re}(\zeta) \geq 0,\ \mathrm{Im}(\zeta) \geq 0$

längs des Integrationsweges.

$$g_m(z,z';\lambda) = i\,\frac{e^{i\zeta|z-z'|}}{2\zeta}$$

$$\boxed{G(r,\varphi,z;r',\varphi',z') = \frac{i}{4\pi}\sum_{m=-\infty}^{\infty} e^{im(\varphi-\varphi')}\int_{\mathcal{C}_0} J_m(\lambda r)\, J_m(\lambda r')\, e^{i\zeta|z-z'|}\,\frac{\lambda\, d\lambda}{\zeta}}$$

$k_2 = 0, \quad k = k_1$