$z' = 0$ $\qquad G = \frac{i}{8\pi}\sum_m G_m\, e^{im(\varphi-\varphi')}$ $\qquad$ (Karten von S. 2). $\qquad$ 4

$$J_m(x) \approx \sqrt{\frac{2}{\pi x}}\cos\left[x - \left(m+\tfrac{1}{2}\right)\tfrac{\pi}{2}\right]$$
$$H_m^{(1)}(x) \approx \sqrt{\frac{2}{\pi x}}\, e^{i\left[\qquad\qquad\right]}$$

$$G_m = \int_{\mathcal{C}} d\zeta\, e^{iz\zeta} J_m(\lambda r_<) H_m^{(1)}(\lambda r_>)$$

$$\approx \int_{\mathcal{C}} d\zeta\, e^{iz\zeta}\left[e^{i\lambda(r_>-r_<)} + e^{i\lambda(r_>+r_<)} e^{-i(m+\frac{1}{2})\pi}\right]\frac{1}{\pi\sqrt{r_< r_>}}, \qquad |\lambda r| \gg 1$$

$\zeta = R e^{i\psi}$, $\qquad e^{i\zeta z} = e^{-zR\sin\psi}\, e^{izR\cos\psi}$; $\qquad z\sin\psi \geq 0 \Rightarrow$

$d\zeta = iRe^{i\psi}d\psi$; $\qquad \operatorname{Im}(\lambda) = \lambda_2 \geq 0$.

$z \geq 0$: C_1, C_2, C_+

$z \leq 0$: C_3, C_4, C_-

$z \geq 0$:
$$\lim_{R\to\infty}\left|\int_{C_1} d\zeta\, e^{iz\zeta} J_m(\lambda r_<) H_m^{(1)}(\lambda r_>)\right| = 0,$$
$$\lim_{R\to\infty}\left|\int_{C_2} d\zeta\, e^{iz\zeta} \qquad\qquad\right| = 0.$$

$z \leq 0$:
$$\lim_{R\to\infty}\left|\int_{C_3} d\zeta\, e^{iz\zeta} \qquad\qquad\right| = 0$$
$$\lim_{R\to\infty}\left|\int_{C_4} d\zeta\, e^{iz\zeta} \qquad\qquad\right| = 0$$

$z \geq 0$:
$$G_m = \int_{C_+} d\zeta\, e^{iz\zeta} J_m(\lambda r_<) H_m^{(1)}(\lambda r_>) = \int_{-\infty}^{\infty}\frac{\lambda\, d\lambda}{\sqrt{\kappa^2-\zeta^2}} J_m(\lambda r_<) H_m^{(1)}(\lambda r_>)\, e^{iz\sqrt{\kappa^2-\lambda^2}}$$

C_+: ζ: $i\infty \to \kappa \to i\infty$ $\qquad \zeta = \sqrt{\kappa^2-\lambda^2}$, $\quad d\zeta = -\frac{\lambda\, d\lambda}{\sqrt{\kappa^2-\lambda^2}} = -\frac{\lambda\, d\lambda}{\zeta}$;

λ: $\infty \to 0 \to -\infty$. $\qquad \lambda = \sqrt{\kappa^2-\zeta^2}$

$z \leq 0$:
$$G_m = \int_{C_-} d\zeta\, e^{iz\zeta} J_m(\lambda r_<) H_m^{(1)}(\lambda r_>) = \int_{-\infty}^{\infty}\frac{\lambda\, d\lambda}{\sqrt{\kappa^2-\zeta^2}} J_m(\lambda r_<) H_m^{(1)}(\lambda r_>)\, e^{-iz\sqrt{\kappa^2-\lambda^2}}$$

C_-: ζ: $-i\infty \to -\kappa \to -i\infty$, $\qquad \zeta = -\sqrt{\kappa^2-\lambda^2}$, $\quad d\zeta = \frac{\lambda\, d\lambda}{\sqrt{\kappa^2-\lambda^2}}$;

λ: $-\infty \to 0 \to \infty$.