

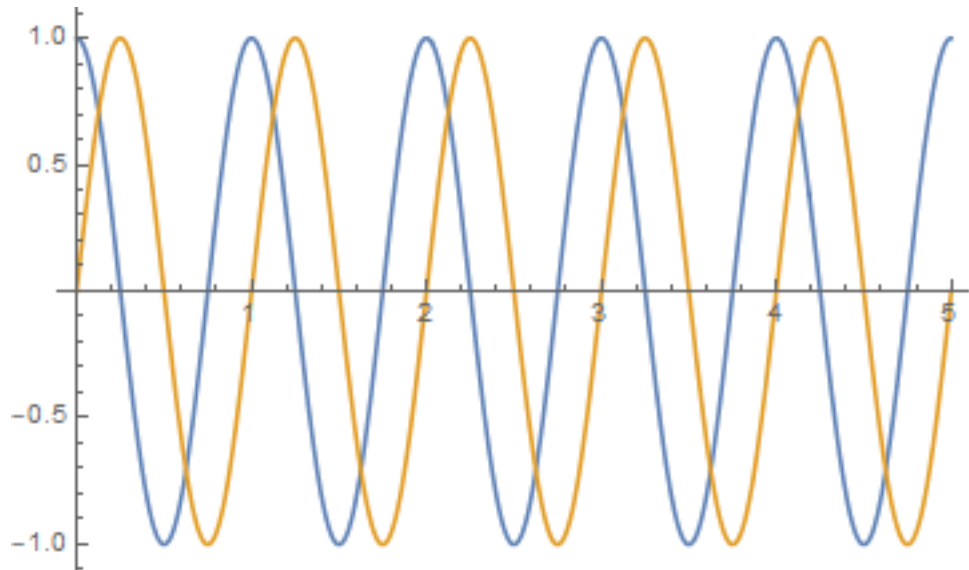
Rayleigh's Formula for Plane Wave Expansion

$$e^{ikz} = \sum_{\ell=0}^{\infty} i^{\ell} (2\ell + 1) j_{\ell}(kr) P_{\ell}(\cos \theta) \quad \text{Eq. (10.28) of Griffiths}$$

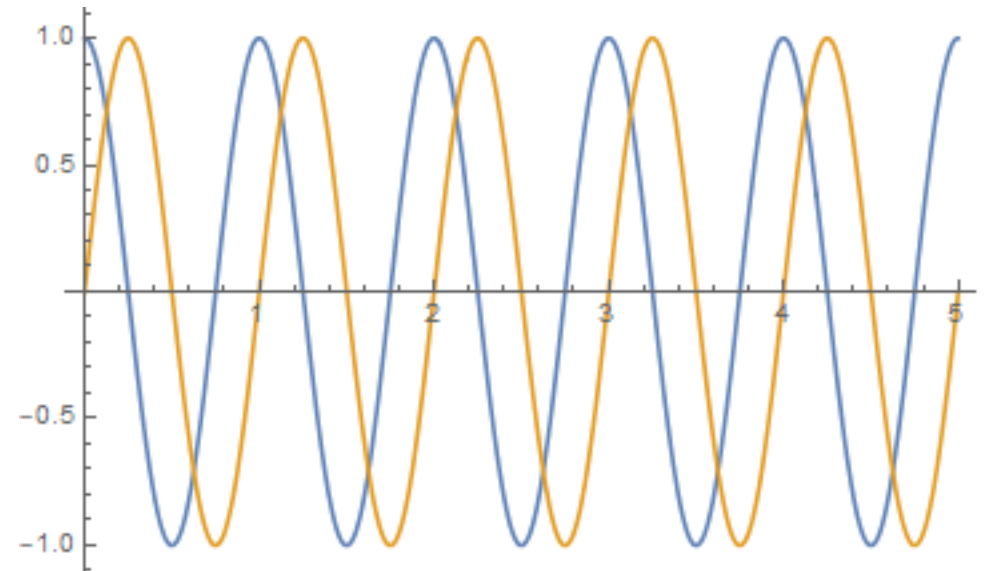
EtoTheikz[k_, r_, θ _, Nmax_] := Sum[i^l(2l + 1)SphericalBesselJ[l, kr]LegendreP[l, Cos[θ]], {l, 0, Nmax}]

SimpleEtoTheikz[k_, z_] := e^{ikz}

{Re[SimpleEtoTheikz[2 π , z]], Im[SimpleEtoTheikz[2 π , z]]}

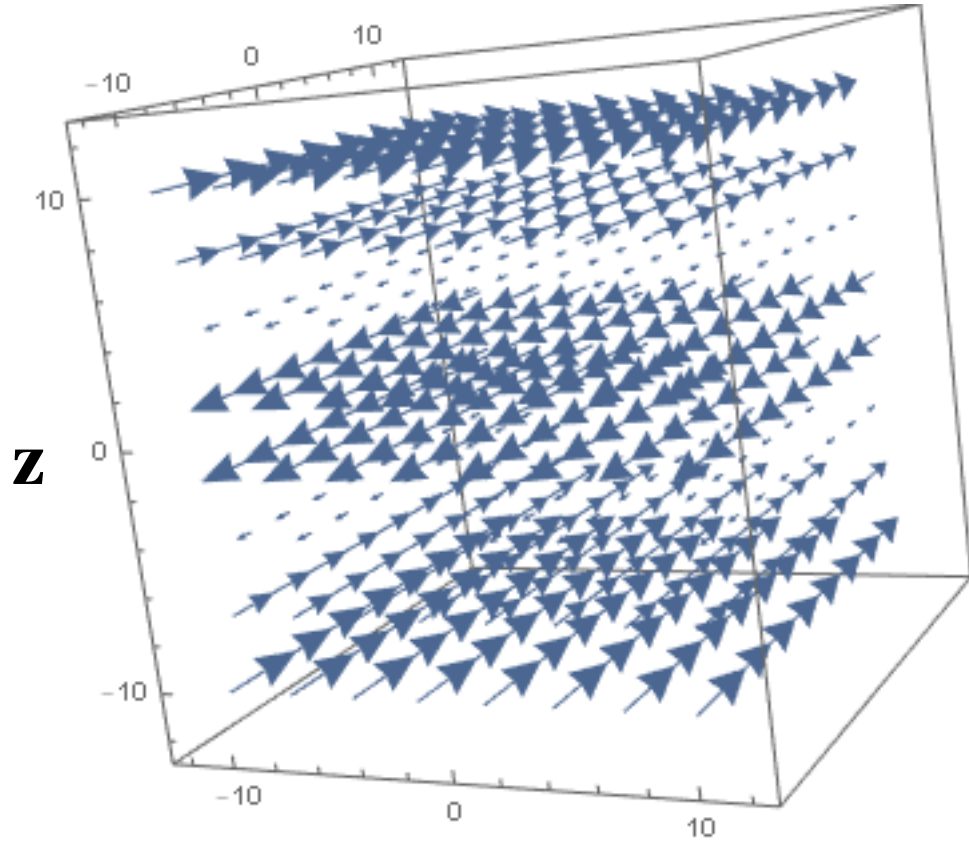


{Re[EtoTheikz[2 π , r, 0, 100]], Im[EtoTheikz[2 π , r, 0, 100]]}



Vector Plots of Plane Wave

`VectorPlot3D[{0,1,0}Cos[2πz]`



`VectorPlot3D[{0,1,0}Re[EtoTheikz[2π, r, 0,100]]`

