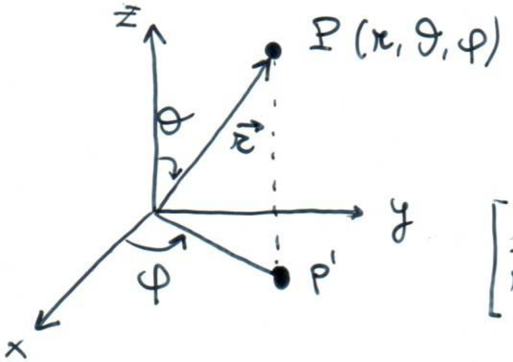
EQ. d. ONDE IN COORDINATE SFERICHE



$$\nabla^2 \psi = -\frac{\omega^2}{c^2}\psi$$

$$\left[\frac{1}{r^2}\frac{\partial}{\partial r}\left(r^2\frac{\partial}{\partial r}\right) + \frac{1}{r^2 \sin\vartheta}\frac{\partial}{\partial \vartheta}\left(\sin\vartheta \frac{\partial}{\partial \vartheta}\right) + \frac{1}{r^2 \sin^2\vartheta}\frac{\partial^2}{\partial \varphi^2}\right]\psi = -\frac{\omega^2}{c^2}\psi$$

$$\psi(r,\vartheta,\varphi) = R(r)\,\Theta(\vartheta)\,\Phi(\varphi)$$

$$\psi(r,\vartheta,\varphi) = \sum_{l,m} R_l(r)\,\underbrace{Y_{l,m}(\vartheta,\varphi)}_{\text{ARMONICHE SFERICHE}} \qquad l,m = 0, 1, \ldots\ldots$$

ARMONICHE SFERICHE → MODULAZIONE ANGOLARE

$$\frac{d^2R_l}{dr^2} + \frac{1}{r}\frac{dR_l}{dr} + \left(\frac{\omega^2}{c^2} - \frac{l(l+1)}{r^2}\right)R_l = 0 \qquad \frac{\omega^2}{c^2} = K^2$$

FUNZIONI DI BESSEL DI ORDINE $\nu = l + 1/2$
ARGOMENTO Kr

$$R_l : \; J_{l+1/2}(Kr) \;,\; N_{l+1/2}(Kr) \qquad r \neq 0$$

$$\psi(r,\vartheta,\varphi) = \sum_{l,m,\omega} \left[\frac{A_{l,m}}{r^{1/2}} J_{l+1/2}(kr) + \frac{B_{l,m}}{r^{1/2}} N_{l+1/2}(kr) \right] Y_{l,m}(\vartheta,\varphi)$$

$$f(P,t) = \sum_{\omega,l,m} \left[\frac{A'_{l,m}}{r^{1/2}} J_{l+1/2}(kr) + \frac{B'_{l,m}}{r^{1/2}} N_{l+1/2}(kr) \right] Y_{l,m}(\vartheta,\varphi)\, e^{-i\omega t}$$

$$r \to \infty \qquad \frac{J_{l+1/2}(kr),\ N_{l+1/2}(kr)}{r^{1/2}} e^{-i\omega t} \propto \frac{1}{r} e^{i\underline{kr}} e^{-i\underline{\omega t}}$$

ONDA SFERICA.

(CON MODULAZIONE ANGOLARE)