TALLER II

$$\nabla^2 u = \frac{1}{v^2}\frac{\partial^2 u}{\partial t^2} \rightarrow \text{ec. onde.}$$

↳ cilíndricas $\quad u(r,\theta,t)$

$\nabla^2 u \rightarrow$ esféricas $\longrightarrow$ Pol. de Legendre

$\nabla^2 u \rightarrow$ cilíndricas $\longrightarrow$ Ecs. de Bessel.

S.V.

$$u = S(r,\theta)T(t)$$

$$T(t) = e^{\mp i\omega t} \quad , \; k^2 = \frac{\omega^2}{v^2}$$

↑ const. 1ra separación.

$$\nabla^2 S + k^2 S = 0 \quad , \; S(r,\theta) = R(r)\,\Theta(\theta)$$

S.V. ($-m^2$ const. 2da separación).

$$\frac{r^2}{R}\frac{d^2R}{dr^2} + \frac{r}{R}\frac{dR}{dr} + \frac{1}{\Theta}\frac{d\Theta}{d\theta} + r^2k^2 = 0$$

↳ ω^2/v^2

$$\frac{1}{\Theta}\frac{d^2\Theta}{d\theta^2} = -m^2 \rightarrow \frac{d^2\Theta}{d\theta} + m^2\Theta = 0$$

$$\hookrightarrow \Theta = e^{\pm im\theta}$$

Parte radial

$$r^2\frac{d^2R}{dr^2} + r\frac{dR}{dr} + (k^2r^2 - m^2)R = 0 \rightarrow \text{ec. de Bessel}$$

$$R(r) = J_m(kr)$$

$$u_{mn}(r,\theta,t) = R(r)\,\Theta(\theta)\,T(t)$$

Cond. de Frontera.

$$R(r = r') = 0 \rightarrow J_m(kr') = 0$$

$$\mu_n^m \Rightarrow k_{mn} = \frac{\mu_n^m}{r'}$$

$\uparrow$

raíces.

F.B. Estrics

$j_n(x) = J_{n+\frac{1}{2}}(x)$ $\qquad$ $y_n(x) = Y_{n+\frac{1}{2}}(x)$

→ Artken

→ Chow