Ecuación de Onda 2D:

$$u_{tt}(x,y,t) = \alpha^2 u_{xx}(x,y,t) + \beta^2 u_{yy}(x,y,t)$$

En coordenadas cilíndricas

$$u_{tt}(\rho,\phi,t) = \alpha^2\left(u_{\rho\rho} + \frac{1}{\rho}u_{\rho}\right) + \beta^2\left(\frac{1}{\rho^2}u_{\phi\phi}\right)$$

Discretizando:

$$\frac{u_{i,j}^{l+1} - 2u_{i,j}^{l} + u_{i,j}^{l-1}}{\Delta t} = \alpha^2\left[\left(\frac{u_{i+1,j}^{l} - 2u_{i,j}^{l} + u_{i-1,j}^{l}}{(\Delta\rho)^2}\right) + \frac{1}{\rho[i]}\left(\frac{u_{i+1,j}^{l} - u_{i-1,j}^{l}}{\Delta\rho}\right)\right] + \beta^2\left[\frac{u_{i,j+1}^{l} - 2u_{i,j}^{l} + u_{i,j-1}^{l}}{(\Delta\phi)^2}\right]$$

$$u_{i,j}^{l+1} = \frac{\alpha^2 (\Delta t)^2}{(\Delta \rho)^2}\left[\left(u_{i+1,j}^{l} - 2u_{i,j}^{l} + u_{i-1,j}^{l}\right) + \frac{\Delta \rho}{\rho[i]}\left(u_{i+1,j}^{l} - u_{i-1,j}^{l}\right)\right]$$

$$+ \frac{\Delta t^2 \beta^2}{(\Delta \phi)^2}\left[u_{i,j+1}^{l} - 2u_{i,j}^{l} + u_{i,j-1}^{l}\right]$$

$$\therefore \quad u_{i,j}^{l+1} = V^2\left[\left(u_{i+1,j}^{l} - 2u_{i,j}^{l} + u_{i-1,j}^{l}\right) + \frac{\Delta \rho}{\rho[i]}\left(u_{i+1,j}^{l} - u_{i-1,j}^{l}\right)\right]$$

$$+ \lambda^2 \left[u_{i,j+1}^{l} - 2u_{i,j}^{l} + u_{i,j-1}^{l} \right]$$