

## 2D Eigenvalue Problems (Collocation method)

PDEs (must be linear):

$$\begin{aligned} F_1(x, y, U_1, U_{1x}, U_{1y}, U_{1xx}, U_{1yy}, U_{1xy}, \dots) &= \lambda\rho_{11}(x, y)U_1 + \dots + \lambda\rho_{1N}(x, y)U_N \\ &= \\ &= \\ F_N(x, y, U_1, U_{1x}, U_{1y}, U_{1xx}, U_{1yy}, U_{1xy}, \dots) &= \lambda\rho_{N1}(x, y)U_1 + \dots + \lambda\rho_{NN}(x, y)U_N \end{aligned}$$

Boundary conditions:

$$\begin{aligned} G_1(x, y, U_1, U_{1x}, U_{1y}, \dots, U_N, U_{Nx}, U_{Ny}) &= 0 \\ &= \\ &= \\ G_N(x, y, U_1, U_{1x}, U_{1y}, \dots, U_N, U_{Nx}, U_{Ny}) &= 0 \end{aligned}$$

(periodic and "no" boundary conditions are also permitted)