

1D Steady-State Problems (Collocation method)

ODEs:

$$\begin{aligned} F_1(x, U_1, U_{1x}, U_{1xx}, \dots, U_N, U_{Nx}, U_{Nxx}) &= 0 \\ &\cdot &= \cdot \\ &\cdot &= \cdot \\ F_N(x, U_1, U_{1x}, U_{1xx}, \dots, U_N, U_{Nx}, U_{Nxx}) &= 0 \end{aligned}$$

Boundary conditions (at endpoints):

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

(Periodic and “no” boundary conditions are also permitted.)