Assignment

1) Compute the natural frequencies of the free-fixed bar of slide 3 ($\rho = 2700\ kg/m^3$, $E = 70\ GPa, L = 2\ m,$ $\mathrm{b} = \mathrm{h} = 0.05\ \mathrm{m}$) in the frequency range [0 10] kHz and plot the corresponding mode shapes.

2) Compute the natural frequencies of the same bar in free-free conditions and plot the corresponding mode shapes.

3) For the free-fixed bar excited at the free-end, plot and comment the FRF for output positions located in $\bar{x} = L/2$ and $\bar{x} = L/5$. Consider the following cases:

    - undamped bar (standing wave solution);
    - damped bar (wave propagation solution) – loss factor $\eta = 0.01$;
    - damped bar (modal superposition approach) – loss factor $\eta = 0.01$.

4) For the free-fixed bar excited at the free-end, plot and comment the driving-point impedance in the following cases:

    - damped bar (wave propagation solution) – loss factor $\eta = 0.01$;
    - damped bar (modal superposition approach) – loss factor $\eta = 0.01$.