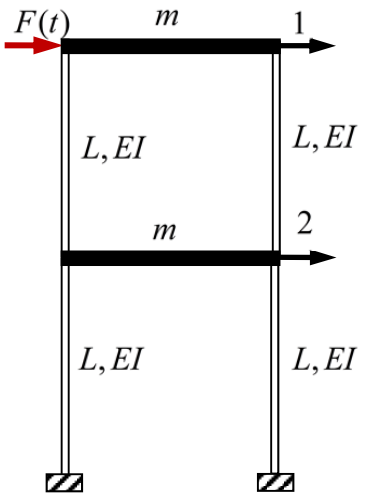


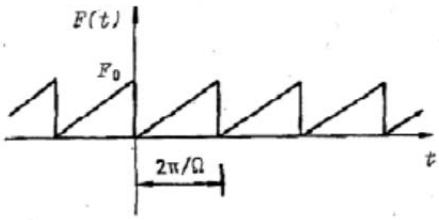
$$\boldsymbol{K} = \frac{EI}{L^3}\begin{bmatrix} 24 & -24 \\ -24 & 48 \end{bmatrix}$$

$$\boldsymbol{M} = \begin{bmatrix} m & 0 \\ 0 & m \end{bmatrix}$$

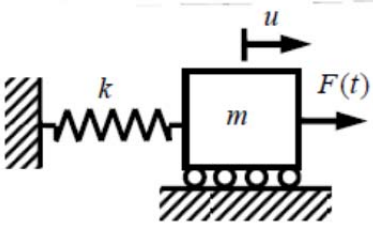
1. Horizontal beams are rigid with the mass *m*, and vertical beams have no mass and no axial flexibility.

   a) The force $F(t) = F_0 \sin \Omega t$ is acting on the first DOF, where $\Omega = 1{,}5\omega_1$ and ω_1 is the lowest natural eigenfrequency. Determinate the steady state response when the damping ratio is $\zeta = 0{,}10$ (for both eigenmodes)

   b) If $\Omega = (\omega_1 + \omega_2)/2$, where ω_2 is the second natural eigenfrequency, determinate the steady state response for the undamped system.



2. Esitä kuvan heräte *FOURIER*-sarjana ja määritä vaimentamattoman yhden vapausasteen systeemin vaste $u(t)$. Piirrä herätteen ja vasteen kuvaajia, jotka vastaavat *FOURIER*-sarjan alkupään termejä. $\Omega = 2$ 1/s , $\Omega/\omega = 0{,}80$



Express the harmonic excitation by Fourier series and determinate the response of the undamped 1DOF vibrator. Draw curves for the excitation approximation and the response using one and three terms of Fourier series.
$\Omega = 2$ rad/sec, $\Omega/\omega = 0{,}80$