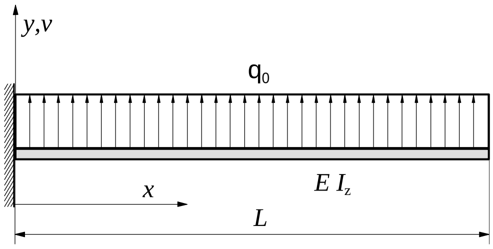
Tampere University of Technology

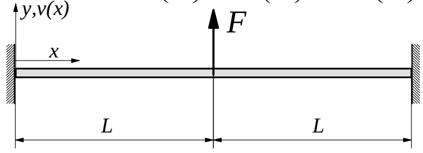
EDE-21100 Finite Element Method. Exercise 4 Autumn 2013.

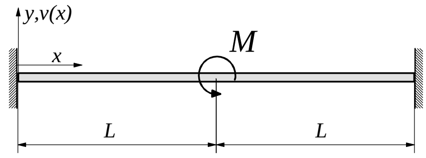
1. Solve the estimate of deflection curve $v(x)$ for the beam ($E\,I_z$) below. Use the principle of minimum potential energy. Compare decflection v(L) to exact value (see exercise 3). Use kinematically admissible trial function chosen from polynomials $p(x)=\alpha_0+\alpha_1\left(\frac{x}{L}\right)+\alpha_2\left(\frac{x}{L}\right)^2+\alpha_3\left(\frac{x}{L}\right)^3$



2. Solve the estimate of deflection curve $v(x)$ for the beam ($E\,I_z$) below. Use the principle of minimum potential energy. Model only symmetric half of the beam and choose kinematically admissible trial function from polynomials

$$p(x)=\alpha_0+\alpha_1\left(\frac{x}{L}\right)+\alpha_2\left(\frac{x}{L}\right)^2+\alpha_3\left(\frac{x}{L}\right)^3$$





3. The Young's modulus of the both rods is E. Compute the tip displacement $u(L)$ and rod stresses. Use the principle of minimum potential energy. Use trial function $\tilde{u}_1(x_1)=Q_1\left(\frac{2x_1}{L}\right)$ for the left rod and $\tilde{u}_2(x_2)=Q_1\left(1-\frac{2x_2}{L}\right)+Q_2\left(\frac{2x_2}{L}\right)$ for the thinner rod. Compare resuls to the exact values.