

Assignment 3

1. Code for analysis of truss system

Idealize the simple truss system shown in Figure 1 as an assemblage of two truss elements. The two truss elements have the same length L , the same elastic modulus E , and the same cross section area A . The time-variant load tR is applied at node 1. It is assumed that the structure is subjected to large displacement and large strain, but the material still keeps in its elastic region. It is also assumed that the elements have only stress normal to the cross section, and the stress is constant along the element.

Note: The tangent stiffness matrix and the governing equilibrium equation of this system were considered in Assignment 2.

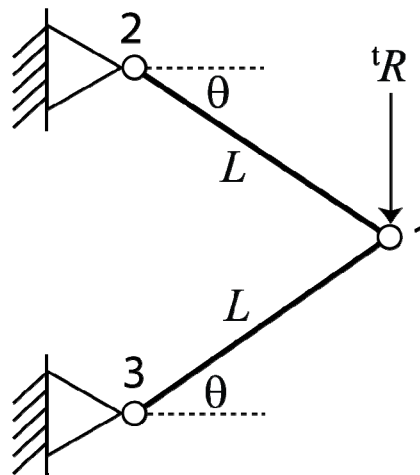


Figure 1. Considered truss system

(1.1) Create a nonlinear finite element code in MATLAB for the analysis of this system. Use the (modified) Newton-Raphson method for the iteration scheme.

(1.2) Plot the relationship between the vertical displacement at node 1 and the applied load, assuming that $E = 200kN/mm^2$, $A = 100mm^2$, $L = 1000mm$ and $\theta = 30^\circ$. Assume also that the load tR is applied vertically as is shown in Figure 1.

Note: Please submit the MATLAB code as an .m file in an electronic format.