

## Assignment 3

### 1. Code for analysis of truss structure

Consider the truss structure consisting of two truss elements shown in Figure 3.1. Each of truss elements has the length  $L$ , the elastic modulus  $E$ , and the cross section area  $A$ . The load  $R$  is applied at node 1. It is assumed that the structure is subjected to large displacement and large strain, but keeping the elasticity. It is also assumed that the truss element has 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 structure were considered in assignment 2.

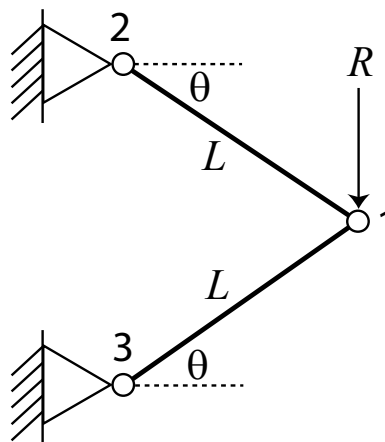


Figure 3.1. Considered truss structure.

- 3.1) Create a nonlinear finite element code in MATLAB for the analysis of this truss structure. Use the (modified) Newton-Raphson method for the iteration scheme.
- 3.2) Draw the relationship between the 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  $R$  is applied vertically as is shown in Figure 3.1.

Note: The MATLAB code should be submitted as an .m file in an electronic format.