

Assignment 2

1. Finite element equation of truss structure

Consider the truss structure consisting of two truss elements shown in Figure 2.1. Each of the 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: this truss structure will be considered in the forthcoming assignments where the nonlinear finite element code for the analysis of this truss structure is established and the response of the structure is analyzed.

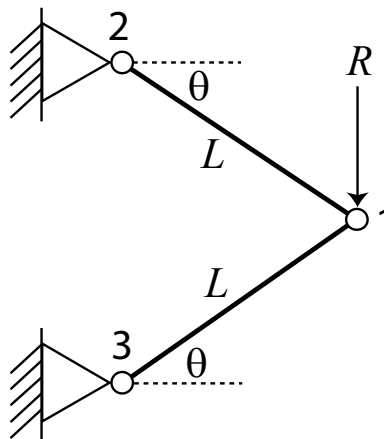


Figure 2.1. Considered truss structure.

- 2.1) Derive the tangent stiffness matrix for the truss structure and the nodal point force in the configuration at time t .
- 2.2) Derive the governing finite element equation of the structure in any configuration.

Hint: Example 6.16 and 6.17 in Bathe (1996) may be useful.