Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student number\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Assignment 2**

Derive the virtual work expressions for the element shown in terms of the nodal displacement components of the structural system. Use linear approximations to the displacement components. Cross-sectional area and density of the initial geometry are  and , respectively, and elasticity parameter .



*Z, y*

*Y, x*

2

1



**Solution template**

Virtual work densities of the bar model according to the large displacement theory are given by

, 

in which the Green-Lagrange strain measure and its variation

, .

Linear approximations to displacement components in terms of nodal displacement components of the structural system and the body force components are given by

, , ,

, , .

Green-Lagrange strain measure and its variation in terms of displacement components of the structural system are

, .

Virtual work densities of internal and external distributed forces

 ,

 .

Finally, virtual work expressions are integrals over the initial domain

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