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

**Assignment 4**

A simply supported plate is loaded by distributed force  as shown in the figure. Determine the displacement  by using the principle of virtual work. Consider the plate bending mode only and use approximation  in which  is a parameter. Material properties *E*, , *ρ* and thickness *t* are constants. The shape functions of the approximation satisfy, e.g.,

*x*

*y*

*L*

*f*

*L*

.

**Solution template**

Assuming that the material coordinate system is chosen so that the plate bending and thin slab modes decouple, virtual work densities of the Kirchhoff plate model are given by

 and .

in which the elasticity matrix of plane stress

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Approximation to the transverse displacement and its derivatives

 

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When the approximation and the expression for the distributed force are substituted there, virtual work densities simplify to



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Virtual work expressions are integrals of the virtual work densities over the domain occupied by the element

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Principle of virtual work and the fundamental lemma of variation calculus give

  

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Displacement

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