2.092/2.093

FINITE ELEMENT ANALYSIS OF SOLIDS AND FLUIDS I

FALL 2009

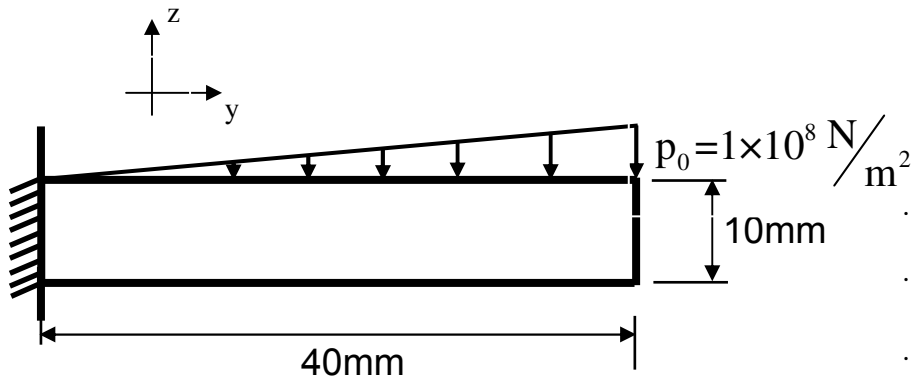
Homework 6

Instructor:	Prof. K. J. Bathe	Assigned: Session 14
TA:	Seounghyun Ham	Due: Session 16

In all analyses, use ADINA.

Problem 1 (20 points):

The figure below shows a cantilever beam subjected to distributed pressure. Use ADINA to analyze the problem and undertake a convergence study using 9-node elements. Compare the stress fields obtained with meshes of 1×4, 2×8, 4×8, and 4×16 elements. Also evaluate your results comparing with a beam theory result.



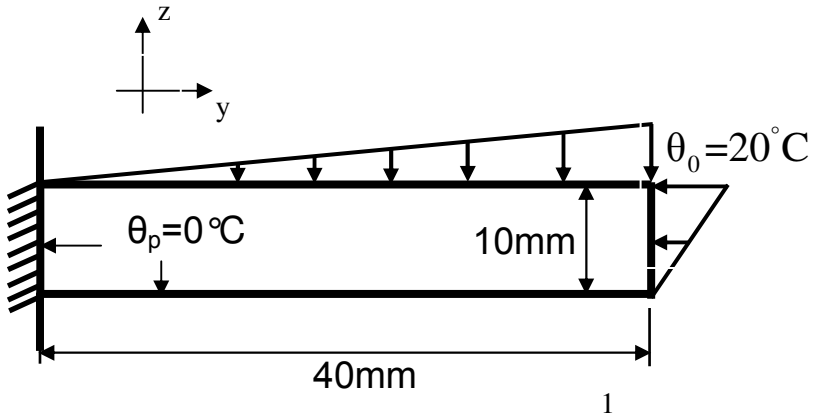
· Plane strain, thickness 1.0

· Linear analysis

· $E=1\times10^{11}\ N/m^2$, $\nu=0.3$

Problem 2 (20 points):

Consider the same cantilever beam but this time subjected to the prescribed surface temperature shown below. Compare the temperature distributions obtained with meshes of 1×4, 2×8, 4×8, and 4×16 4-node elements, and comment briefly on your results.

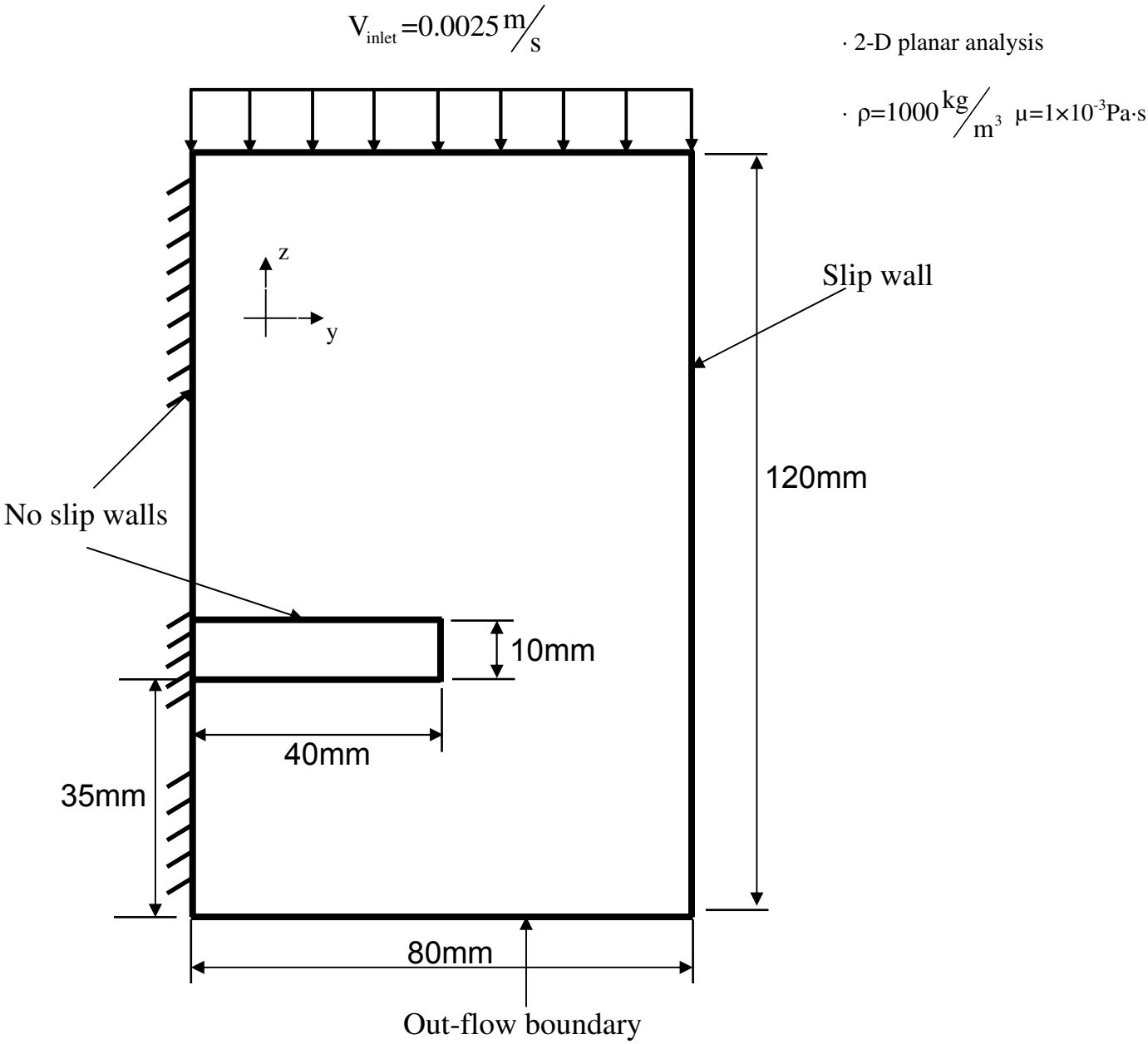


· 2-D linear analysis

· $k=71.8\ W/mK$

Problem 3 (20 points):

Consider the problem shown below of a fluid flowing around a cantilever beam. Assume that the cantilever beam is a rigid body. Study the velocity and pressure distributions in the fluid domain by increasing the number of elements, and choose appropriate meshes. Comment briefly on your results. Use 4-node elements.



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