Laboratory work №1
PLANE STRESS TENSION OF A PLATE WITH A HOLE
Individual assignments

Individual assignments: plates in the shape of letters.

Consider a problem of a plate tension for the plate in the shape of the letter with a small round hole (the hole can be cut out in any part of the letter). The bottom edges of the letter should be rigidly fixed, and the top edges are loaded with uniform tension. Take the geometrical dimensions of the letter and the load value similar to those of the example problem. If possible, take advantage of symmetry when building the domain. Consider the plate to be made of any elastic isotropic material. The objective is to conduct plane stress structural analysis and define maximal stresses in the plate.

- Perform computations in ANSYS (both in interactive and command mode) and FlexPDE and compare the results.
- In ANSYS, estimate convergence of results (displacements UX and UY) for different sizes of finite element mesh and for different types of finite elements (compare linear 4-node and quadratic 8-node quadrilaterals). Find optimal parameters for the finite element mesh and make conclusions. Present a report.

Requirements to the report.

The report should contain the name of the student, the full description of the problem with the domain sketch and the results obtained in ANSYS using both interactive and command modes, and in FlexPDE. For ANSYS interactive mode describe the main steps of the modeling. Text of input files for ANSYS and FlexPDE should be also included in the report.

Provide the following computation results:

- finite element mesh with boundary conditions
- picture of the deformed shape
- pictures of the displacements distribution (ux and uy)
- picture of the displacement vector distribution
- pictures of the stresses distribution (three components of the stress tensor σ_{xx}, σ_{xy}, σ_{yy})
- pictures of the strains distribution (three components of the strain tensor ε_{xx}, ε_{xy}, ε_{yy})
- graphs of axial stresses (σ_{xx} or σ_{yy}) along the path containing the point of maximum
- analyze convergence of the displacements for different mesh size (present results in a table or a graph)
- make conclusions on optimal mesh size and point of maximal stresses or any other conclusions you would like to add

Table 1. Suggestions for the domain shape.

Variant No.	Domain shape	Student name
1.	N	Бежжа Абир
2.	F	Мабиала Детати Селест Стефен
3.	A	Кашу Салуму Кисангаси
4.	W	Киспе Зурита Эстебан Франсиско
5.	X	Хоссаин Фархад
6.	Z	Чжан Фан