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MODULAR PROGRAMME

COURSEWORK ASSESSMENT SPECIFICATION

Module Details

Module Code UFM-FU7-15-3	Run Oct-2019	Module Title Computational Methods
Module Leader Moosa S. Al-Kharusi	Module Coordinator Moosa S. Al-Kharusi	Module Tutors Moosa S. Al-Kharusi
Component and Element Number B - 1		Weighting: (% of the Module's assessment) 37.5%
Element Description FEA Assignment		Total Assignment time 18 hours

Dates

Date Issued to Students 5 th Nov 2019	Date to be Returned to Students
Submission Place	Submission Date 28 th Nov 2019
Blackboard	Submission Time 14:00hrs

Deliverables

Upload a report of no more than 8 A4 pages (minimum font 11) to Blackboard in pdf format (this should permit comments to be annotated during marking).

Module Leader Signature

Moosa S. Al-Kharusi

Introduction

In this assignment you are asked to provide a short report (maximum 8 A4 pages) on the behavior of a flat plate, a beam model using different element types and compare the results. You will model and analyses the structure in the ANSYS environment.

Do not forget to apply good writing practices: structure your report, do not neglect introduction, conclusions and bibliography, be careful with the rules around illustrations.

You are expected to analyses the structure using analytical and FEA method that you consider to be appropriate for obtaining a particular level of accuracy.

You must **work in pairs and submit one assignment per pair**. Once you have agreed with another student that you will work with them, **please write your name(s) in the given excel sheet. You will have until 26/11/2019 to do this**. After this date any students that have not enrolled in a group will be randomly allocated another student to work with (please get in touch if you have issues or queries, be proactive). Under some circumstances, student will be allowed to work individually, but please first seek authorisation from the module leader, in writing.

Task 1

Perform a static stress analysis with linear material models on the problem shown in Figure 1 utilizing different mesh densities. Use meshes of 200, 400, 800, and 1600 elements. The thickness of the part given below is 8mm. A load of n MPa is applied on the right edge, where n is the last **two** digits of your UWE ID number. (for instance, for student 14020174, n is **74**). The left end is fully fixed. Material is stainless steel (AISI 302) cold rolled. Assume it as a plane stress problem.

Calculate stress concentration factor and compare with that of given in mechanics textbook. Write your comments in comparison with analytical solution.

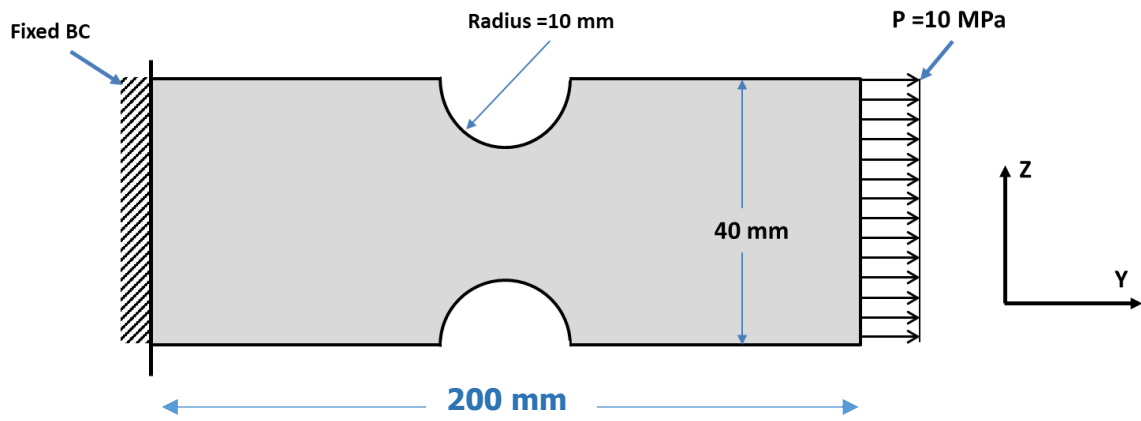


Figure 1

Task 2:

Analyse a beam model using different element types and compare the results. A n kPa load is acting downward along the top, where n is the last three digits of your UWE ID number. (for instance, for student 14020174, n is 174). The left end is fixed, and the right end is simply supported. Material steel (AISI 4130). Length of the beam is **250 mm** along x -axis. The cross-section is rectangular (**13mm** along z -axis & **6mm** along y -axis) Use following elements in ANSYS and fill the table below.

- a) **1st Plate element:** Model **250mm** x **13mm** dimension and enter a thickness of **6mm**. The pressure must be converted to forces on top edge as follows:
- b) **2nd Plate element:** Model **250mm** x **6mm** dimension and enter a thickness of **13mm**. The pressure is applied as a n kPa surface load.
 - i. For theoretical calculation, use the following relation for uniformly distributed load
 $\rightarrow \text{UDL} = \text{Width} * \text{Pressure}$
- c) **Brick:** The pressure is applied as a n kPa surface load.

Write your comments in comparison with analytical solution.

Element Type	Deflection (m)	Moment (N.m)	Shear (N)	σ_y (Pa)	σ_y (Pa) (near center)	σ_{xy} (Pa)
1 st plate model						
2 nd plate model						
Brick						
Theoretical						

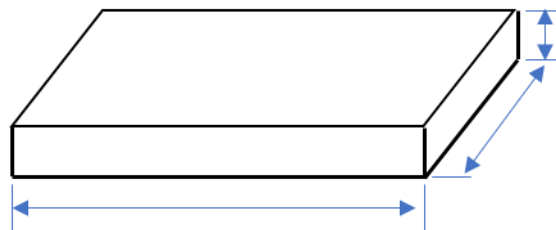


Figure 2

MARKING SCHEME

Task 1		30%
(a)	Modelling strategy and Discussion	20%
(b)	Displacement and Stress plot	5%
(c)	Comments in comparison with analytical solution	5%
Task 2		50%
(a)	Modelling strategy and Discussion	15%
(b)	Displacement plot	5%
(c)	Tabular results	15%
(d)	Comments in comparison with analytical solution	15%
Report	Presentation, Structure, Reliability	20%