PETE 3990 – Mechanical Earth Modeling (Lab)
Craft and Hawkins Department of Petroleum Engineering
Louisiana State University
Spring 2017

Lab sessions: 1108 Patrick F Taylor Hall

Time: F 3:30 - 4:50 PM

Instructor: Dr. Arash Dahi Taleghani

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Teaching Assistant: Mr. Denis Klimenko

Objectives: Impart students with knowledge of finite element analysis with applications to mechanical earth modeling. The students will learn commercial FEA package (ABAQUS) to solve basic petroleum engineering problems.

Topics:

1. Review of FEA covered in the previous course
2. Basic introduction to ABAQUS CAE and its different component to build a model
3. Two dimensional analysis of basin overburden (Elasticity, building mode, mesh and BCs in ABAQUS, effect of model dimensions)
4. 2D stress distribution around a wellbore (Elasticity, Building model, ties, plotting results, multiple loading steps)
5. Stress and deformation due to injection and production (Poroelasticity, soil solver)
6. Temperature distribution around borehole (with and without mud invasion)
7. Three dimensional analysis of basin (3D stress analysis, results plotting in 3D)
8. 3D analysis of stress distribution around borehole (vertical and horizontal wells, effect of rock permeability)
9. 3D analysis of stress distribution around borehole (Rock plastic behavior, inclined wells)
10. Hydraulic fracturing analysis using cohesive zone methods (Cohesive zone concept, Penny-shaped fractures)

11. Two dimensional analysis of sand production (erosion of material)

General Information:

There will be some pop quizzes based on the course materials during the class time in a random order. The student must be present in the class because lab assignments will be distributed during the class period time. To get credit for a lab assignment, the student must turn in the lab assignment by the following Thursday.

Grade Calculation

Pop Quizzes	15%
Labs	85%

Grading Policy

Grade	
A^+	**>97.00**
A	**93.00-96.99**
A^-	**90.00-92.99**
B^+	**87.00-89.99**
B	**83.00-86.99**
B^-	**80.00-82.99**
C^+	**77.00-79.99**
C	**73.00-76.99**
C^-	**70.00-72.99**
D^+	**67.00-69.99**
D	**63.00-66.99**
D^-	**60.00-62.99**
F	**<59.99**