MEEN 673 **Spring Semester 2023**

Nonlinear Finite Element Analysis

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ASSIGNMENT No. 7
Program on 2D Updated Lagrangian Formulation

Date: 15 April 2023 *Due:* midnight, 23 April 2023

Develop a computer program using the *updated Lagrangian formulation* for 2D elastic bodies with large deflections and strains, but not update the constitutive matrix. Use the Newton iterative technique to solve the nonlinear equations (use a tolerance of $\epsilon = 10^{-3}$ for the convergence on displacements). Submit (a) program listing, (b) output for the validation problem, that is, a cantilever beam under uniform load; see Chapter 9 of the textbook for the details of computer implementation, the problem description and results; and (c) necessary tables and graphs (as listed in the book). The stresses should be post-computed in a subroutine.

Please submit your computer program and results in the same form as those listed in the text book to the grader. There will be no extensions.

Note: Please use the corrected tables placed on CANVAS from Chapter 9 for comparison. The soft-cover edition of the text book already has these corrections.

THE FINAL EXAMINATION

The final comprehensive examination is a take-home examination. The exam papers will be available for pick up at 11am on 27th April 2023, and the solutions are due on 28th April 2023 by 6pm. The final examination is a combination of formulations and computer implementation, requiring some modifications to the programs you have already developed during the course.