

Master thesis proposals at the University of Massachusetts Lowell (USA) Mechanical Engineering Department – Composites & structures.

1) Integrated Computational Material Engineering (ICME) applied to the characterization of progressive failure analysis of virtually cured [0/90]s laminates as a function of the 90-ply thickness.

This study proposes the progressive failure analysis of virtually cured [0/90]s laminates. Models will be created within the commercial software ABAQUS to investigate the influence of the in-situ ply on failure mechanisms of composite laminates. Results will be validated with literature results and physical testing.

2) Influence of the traction-separation law on the progressive failure analysis of Polymer Matrix Composites (PMCs) micro-cracking mechanism using smeared crack approaches.

This work proposes a study on the influence of the traction-separation law to control the damage progression and failure respectively at the micro- and macro-scale for the analysis of composite structures within multi-scale methods.

3) Development of multi-scale platforms within the Carrera Unified Formulation (CUF) using Taylor (TE), Lagrange (LE) and Higher order Lagrange (HL) polynomial functions for the progressive failure analysis of composites.

Fast higher order 1D FE methods are developed to optimize the computational efficiency of a two-scale approach for the progressive failure analysis of composite structures.

4) Integrated Computational Material Engineering (ICME) applied to the characterization of the in-situ shear behavior of Polymer Matrix Composites (PMCs).

This work consists in building a full ABAQUS model (including fibers and matrix portion) of a ± 45 laminate RVE (Representative Volume Element). First, the model will be virtually cured. In a following step the cured model will undergo tensile mechanical loading for the characterization of the matrix in-situ behavior. Results will be validated using available literature results and physical testing.

For additional information and to apply send your resume to [Marianna Maiaru@uml.edu](mailto:Marianna_Maiaru@uml.edu) and erasmo.carrera@polito.it .

The University of Massachusetts Lowell is located in the Greater Boston Area. Conveniently located 30 minutes away from downtown Boston, it is close to the scenic mountains and coasts of New England. The school is the second rising university since 2010 as reported by U.S. news and Worlds report list and it is ranked among the first 66 best public institutions in the U.S.

