DEPARTMENT OF AEROSPACE & ENGINEERING MECHANICS
SAN DIEGO STATE UNIVERSITY

Seminar Announcement

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GMCS Bldg
Room 214

SAN DIEGO STATE UNIVERSITY
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Stacking Sequence Optimization of Composite Aircraft Structures with Blending and Manufacturing Constraints

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The material volume and the stacking sequence of plies in a composite aircraft structure are of vital importance for achieving the material's required mechanical characteristics such as in-plane, flexural and bucking behavior. Ply compatibility (also referred to as blending) between adjacent panels is also a very important consideration in the composite design. Two approaches are examined in this talk for finding the best stacking sequence of laminated composite wing structures with blending and manufacturing constraints: smeared stiffness-based method and lamination parameter-based method. In the first method, the material volume is the objective function at the global level and the stack shuffling to satisfy blending and manufacturing constraints is performed at the local level. The other method introduced in this talk is to use lamination parameters and numbers of plies of the pre-defined angles (0, 90, 45 and -45 degrees) as design variables with buckling, strength and ply percentage constraints while minimizing the material volume in the top level optimization run. Given lamination parameters from the top level optimization as targets for the local level, optimal stacking sequence is determined by a permutation Genetic Algorithm to satisfy the global blending requirements. On a benchmark problem of an 18-panel wing box, the results from these two approaches are compared to published results to demonstrate their potential.

Host: Dr. Satchi Venkataraman