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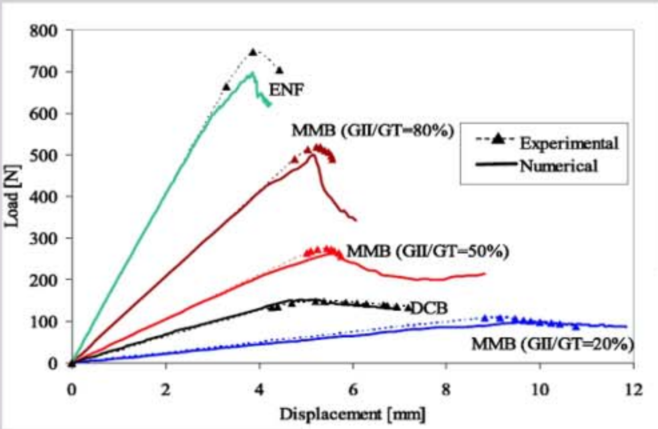
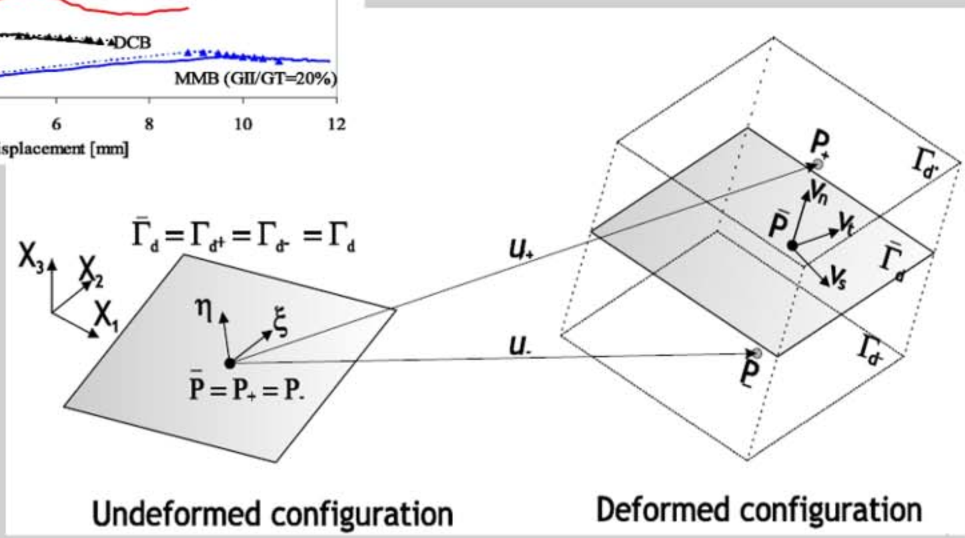
SEMINARIO INTERUNIVERSITARIO DE MECANICA Y MATERIALES

SEMINARIO JOSÉ ANTONIO GARCÍA GARCÍA

MÁSTER DE ESTRUCTURAS

The Long Road to Virtual Testing of Composites
Are we there yet?





Carlos G Dávila

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Lugar: aula 110, 1ª planta de:

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ABSTRACT

The goal of predicting the strength and damage tolerance of composite structures with robust and reliable computational models appears to be reachable. Recent advances in computational methods and numerous published demonstrations of successful representations of the propagation of damage mechanisms have persuaded the industry that the day of reliable tools for the virtual testing of composite structures is imminent. Manufacturers and commercial software vendors alike are "pulling" with unusual force on the work of a modeling community more accustomed to "pushing" the value of its own accomplishments. The increased visibility and scrutiny that new developments in damage modeling are receiving intensifies the need to explore the limits of applicability of these models and to report on the practical robustness of the methodologies. More than ever, it is necessary to formulate under what conditions a model can be expected to work and when it will cease to be accurate. Which damage mechanisms are important and how to select the idealizations that are necessary, physically reasonable, and computationally tractable? What makes the results of validation test cases true predictions rather than calibrated simulations? How much user knowledge is necessary to run an analysis using a particular approach? What material properties are necessary and how can they be measured? In this presentation, we examine under what conditions state-of-the art continuum damage models for composites may not

work as intended. The issues of objectivity of the fracture propagation with respect to the mesh and the effects of interactions between intralaminar and interlaminar damage mechanisms are discussed and emerging unconventional modeling techniques that address these difficulties are presented.

BIO

Carlos Dávila is a Senior Aerospace Research Engineer at the Structural Mechanics and Concepts Branch at the NASA Langley Research Center in Hampton, Virginia. He obtained his Ph.D. degree in Aerospace Engineering in 1991 from the Virginia Polytechnic Institute. Upon graduation, he went to work at the NASA Langley, first as a National Research Council Associate, then as an employee of the Vehicle Technology Directorate of Army Research Laboratory, and finally as a NASA Civil Servant. He has served as a structural analyst in several accident investigations, including a fatal fracture in a US Army helicopter and the fracture of the fin lugs in the American Airlines Airbus A300 2001 accident investigation. His research interests include the development of finite element methods for the prediction of damage propagation and residual strength of metallic and composite structures.

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