FINITE ELEMENT ANALYSIS OF COMPOSITE LAMINATES

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Volume 7

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# Finite Element Analysis of Composite Laminates

by

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# *About the Authors*

Dr. Ozden Ochoa is a professor of Mechanical Engineering at Texas A&M University. Her research in composites focuses on a broad range of problems in mechanics of composite structures, with applications in aerospace, automotive and construction industries. She authored over sixty publications on these topics. She taught shortcourses on the finite element method and principles of composites. Dr. Ochoa serves on national technical committees of Aerospace, Applied Mechanics, and Petroleum Divisions of American Society of Mechanical Engineers. At Texas A&M University, she serves as a faculty advisor to Engineering Scholars Program, University Honors Program, and Accelerated BS/MS Program. She is a member of the Center for Mechanics of Composites and the Offshore Technology Research Center. Dr. Ochoa is recognized as a 1991 University Honors Teacher/Scholar award recipient.

Dr. Reddy is the first holder of the *Oscar S. Wyatt, Jr. Endowed Chair* in Mechanical Engineering at Texas A&M University. Prior to the current appointment, he was the *Clifton C. Garvin Chaired Professor* of Engineering Science and Mechanics at Virginia Polytechnic Institute and State University. He authored over 150 journal papers and six books on the theory and applications of the finite element method, refined theories of laminated composite plates and shells and their finite element analyses, computational fluid mechanics, numerical heat transfer, and applied mathematics. Dr. Reddy serves on the editorial boards of a dozen journals, including: *Journal of Applied Mechanics*, *International Journal for Numerical Methods in Engineering*, and *Journal of Composites Technology and Research*. He received the *1983 Walter L. Huber Research Prize* from the American Society of Civil Engineers and *1992 Worcester Reed Warner Medal* of the American Society of Mechanical Engineers. He is a *Fellow* of the American Academy of Mechanics, the American Society of Mechanical Engineers, the American Society of Civil Engineers, and the Aeronautical Society of India.

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Composite materials are increasingly used in aerospace, under water, and automotive structures. The application of composite materials to engineering components has spurred a major effort to analyze structural components made from them. Composite materials provide unique advantages over their metallic counterparts, but they also present complex and challenging problems to analysts and designers. To take advantage of the full potential of composite materials, structural analysts and designers must have accurate mathematical models and design methods at their disposal. The most common structural elements are plates and shells. An accurate modelling of stress fields and failures is of paramount importance in the design of such components.

The present monograph has the objective of introducing the mechanics concepts, structural theories, and finite element models of composite laminates. Detailed coverage of the basic mechanics of composite materials, theories of composite plates and shells, and the finite element method are avoided in the interest of providing a general background necessary for engineers to analyze composite structures.

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