7TH EDITION

THE FINITE ELEMENT METHOD FOR SOLID & STRUCTURAL MECHANICS

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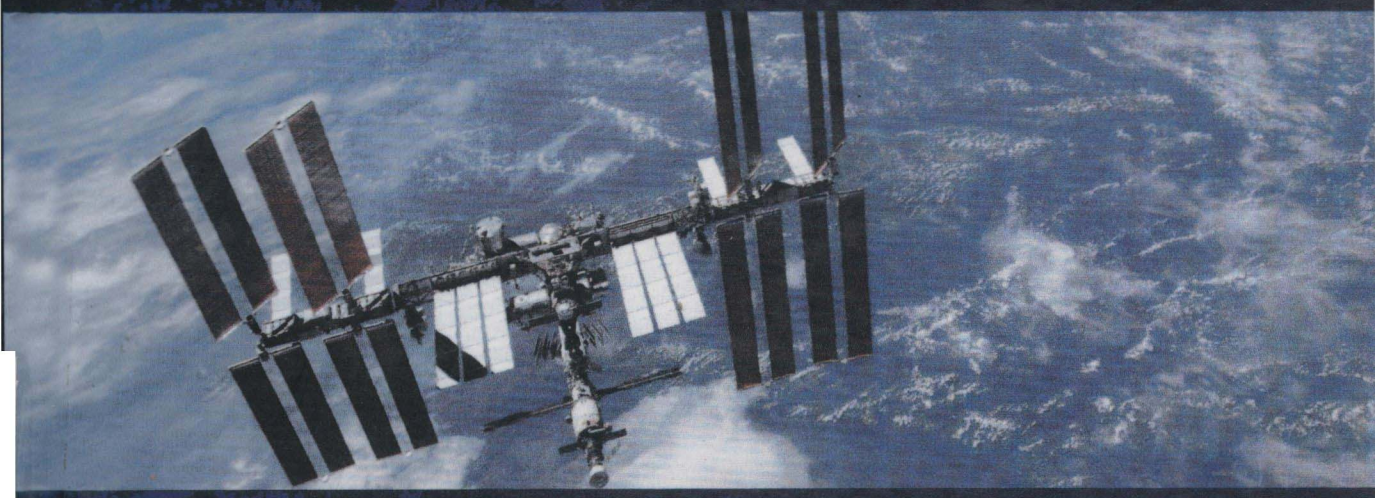

O.C. Zienkiewicz, R.L. Taylor and D.D. Fox

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The Finite Element Method for Solid and Structural Mechanics

Seventh Edition

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The Finite Element Method for Solid and Structural Mechanics

Professor O.C. Zienkiewicz, CBE, FRS, FREng died on January 2, 2009. Prior to his death he was Professor Emeritus at the Civil and Computational Engineering Centre, University of Wales, Swansea and previously was Director of the Institute for Numerical Methods in Engineering at the University of Wales, Swansea, UK. He also held the UNESCO Chair of Numerical Methods in Engineering at the Technical University of Catalunya, Barcelona, Spain. He was the head of the Civil Engineering Department at the University of Wales, Swansea between 1961 and 1989. During this period he established that department as one of the primary centers of finite element research. In 1968 he became the Founder Editor of the *International Journal for Numerical Methods in Engineering* which still remains today the major journal in this field. The recipient of 27 honorary degrees and many medals, Professor Zienkiewicz was a member of five academies—an honor he received for his many contributions to the fundamental developments of the finite element method. In 1978, he became a Fellow of the Royal Society and the Royal Academy of Engineering. This was followed by his election as a foreign member to the US Academy of Engineering (1981), the Polish Academy of Science (1985), the Chinese Academy of Sciences (1998), and the National Academy of Science, Italy (Accademia dei Lincei) (1999). He published the first edition of this book in 1967.

Professor R.L. Taylor has more than 50 years' experience in the modeling and simulation of structures and solid continua including 8 years in industry. He is Professor of the Graduate School and the Emeritus T.Y. and Margaret Lin Professor of Engineering at the University of California at Berkeley and also Corporate Fellow at Dassault Systèmes SIMULIA in Providence, Rhode Island. In 1991 he was elected to membership in the US National Academy of Engineering in recognition of his educational and research contributions to the field of computational mechanics. Professor Taylor is a Fellow of the US Association of Computational Mechanics—USACM (1996) and a Fellow of the International Association of Computational Mechanics—IACM (1998). He has received numerous awards including the Berkeley Citation, the highest honor awarded by the University of California at Berkeley, the USACM John von Neumann Medal, the IACM Gauss-Newton Congress Medal, and a Dr.-Ingenieur Ehrenhalber awarded by the Technical University of Hannover, Germany.

Dr. D.D. Fox has more than 26 years' experience in the research and development of finite element technology. During the last 22 years he has worked at Dassault Systèmes SIMULIA, makers of the Abaqus finite element software program; where he has held various positions ranging from finite element software developer to development group manager. Currently, he is Senior Director in SIMULIA's CTO Office responsible for research into innovative uses of simulation technology in science and engineering. Dr. Fox was awarded his doctoral degree in 1990 from the Division of Applied Mechanics at Stanford University, working under the supervision of Professor Juan Carlos Simo. Dr. Fox is the author of many technical papers on finite element methods, including a seminal series on a stress resultant geometrically exact shell model that resulted in seven parts, covering the mathematical theory, linear and nonlinear finite element implementation, thickness change effects, nonlinear constitutive behavior, transient dynamics simulation, and shell intersections. This highly cited series helped usher in the modern mathematical approach to computational structural mechanics.

This book is dedicated to Olgierd Cecil Zienkiewicz
and Juan Carlos Simo

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