Finite Element Analysis of Structures using MATLAB

"Finite Element Analysis of Structures using MATLAB" is an essential guide for students delving into the world of finite element analysis. This comprehensive resource offers clear explanations, relevant examples, and practical MATLAB code to enhance understanding and application, from the historical foundation of Finite Element Analysis to the exploration of thin and thick plates and structural dynamics.

This comprehensive resource spans twelve chapters and two appendices. Appendix A provides MATLAB code for problem-solving, while Appendix B guides you through using ABAQUS.

The textbook begins with a historical introduction and explores the essentials of finite element analysis. It lets you dive into nodes, elements, interpolation functions, and FEA formalization, focus on one-dimensional and two-dimensional elements and learn numerical integration with Gaussian quadrature. Also, you discover axisymmetric and three-dimensional elements and apply FEA to analyse thin and thick plates. You can explore structural dynamics and vibrations in the final chapter.

Appendix A contains MATLAB code for seventeen numerical examples, and Appendix B offers a step-by-step ABAQUS procedure.

'Finite Element Analysis of Structures using MATLAB' is your ultimate resource for practical understanding. Whether it's coursework or deeper exploration, this book with clear explanations and relevant examples is your invaluable companion."

About the Authors

Dr. M.V. Rama Rao is currently working as a Professor in the Department of Civil Engineering at Vasavi College of Engineering, Hyderabad, India. He obtained his B.Tech degree in Civil Engineering with distinction from JNTU College of Engineering, Kakinada in the year 1986 and stood first in his class. He joined Indian Institute of Technology, Kanpur and obtained M. Tech degree in Structural Engineering in the year 1988. He joined Vasavi College of Engineering as a Lecturer in Civil Engineering in December,1992.

He obtained his PhD degree in Civil Engineering from Osmania University in the year 2005 in Fuzzy-finite element modelling. He carried out Post Doctoral Research under the guidance of Prof. Stefan Vandewalle at the Department of Computer Science, Katholieke Universiteit Leuven, Belgium. He worked in Application of interval and fuzzy methods in applications of Structural Mechanics as a member of the Flemish Research Project entitled SBOFFE project on Fuzzy Finite element methods. He has several international publications in Journals and Conferences. He is a reviewer for several international journals and one National Journal and also a member of technical committees of several international conferences. He has successfully completed three decades of teaching career.

Dr. Andrew Pownuk is working as an Associate Professor at the Department of Mathematical Sciences, University of Texas at El Paso, USA. He did his PhD from the Department of Civil Engineering, Silesian University of Technology in Gliwice, Poland in “Application of Fuzzy Sets Theory to Assessment of Reliability of Civil Engineering Structures” in the year 2001. In the year 2017, he obtained Ph.D. degree in Computational Science, from the University of Texas at El Paso, El Paso, Texas, USA on “Dissertation title: Combining Interval and Probabilistic Uncertainty in Engineering Applications”. He also holds master's degrees in mathematics and also Computational science at the same university. He earlier worked at Institute of Theoretical Mechanics, Department of Civil Engineering, Silesian University of Technology in Gliwice, Poland. He is the author of several book chapters and a textbook in mathematical sciences and computing. He is the author of a large number of publications in international journals.

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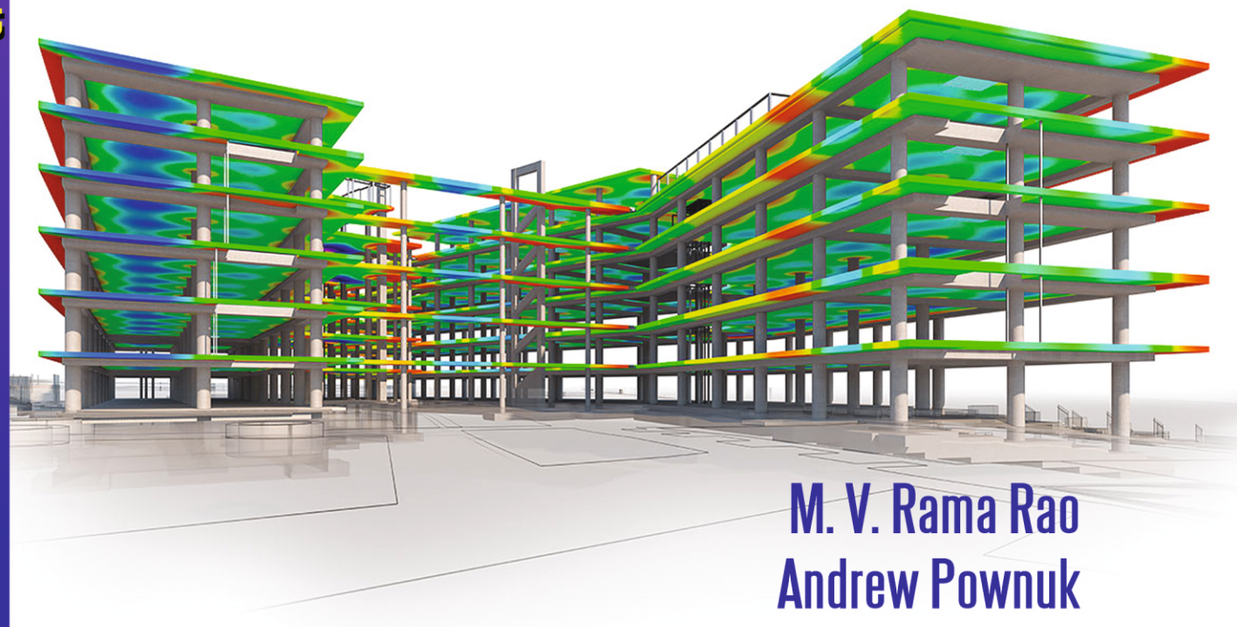

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