Projects in FEM Using MATLAB

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Preface

The use of finite element method for analysing structural mechanics problems began some 55 years ago. With the advent of digital computers many commercial FEA software packages like ANSYS, NASTRAN and ALGOR have been developed and are being employed to day as powerful analysis tools in industry.

Hence, nowadays, in many undergraduate and postgraduate programmes a general treatment of the finite element theory is offered as a course. From this theoretical level, the engineer directly goes to use the advanced package in the industry and has often difficulties in choosing the right element for the given problem, in modelling, in applying the loads, in applying the boundary conditions and in interpreting the results.

There should be an intermediate stage, at which the student should solve a few problems taking them as projects and writing his own software, which will strengthen his understanding of the underlying principles and enhance his computer skills and later help him to utilize the FEM to its full potential industry.

To address this need, in this book, the authors share their accumulated knowledge and experience gained in guiding FEM projects for several years.

Thus, this is a book intended for Mechanical and Civil engineering students taking up FEM projects and for practicing engineers using commercial software. This book will also be useful to Research Scholars wanting to develop their own programs for their specific problems.

How to develop proper input data for a computer program is explained in all details and complete programs in MATLAB are given for all the example problems in this book. The different stages in the solution (output) are also given so that while developing his own program, the student can test his program, in a stage-by-stage manner.

The student is advised to develop his own codes and verify them with the help of closed form solutions of standard problems. During this process the student learns the various steps in programming by going through the codes given in the book.

January, 2014 **Authors**

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