

Preface

This revision and workbook for the finite element method, applied to problems from statics of materials, offers a very specific concept: all the classical derivations are skipped and only the essential final results are briefly summarized. Based on these ‘essentials’, fully solved example problems are presented. To facilitate the initial learning process, we compiled 10 recommended steps for a linear finite element solution procedure (‘hand calculation’) and all the solved examples follow this simple scheme. It is obvious that there are no ‘10 recommended steps’ for real engineering problems or the ‘10 standard problems’ which cover all possible problems that a young engineer may face during his first years of professional work. Nevertheless, the challenges and struggles of some of our engineering students convinced us to compile this study help to master the finite element method.

However, it is essential that students of engineering subjects try to find the way to the final solution on their own and not by simply looking at a full step-by-step solution. Engineering skills and knowledge are acquired by actively training to solve engineering problems. This is best achieved by taking an empty piece of paper and starting the calculation and derivation difficulties from the very beginning. The provided supplementary problems may be used for this approach.

While attempting to solve problems, some students may reach a dead end, i.e. they do not have any further idea on how to proceed, or they may end up with a wrong solution. This is, from an educational point of view, not a major problem but merely another step in the process of learning. Tutors and the lecturer will offer their help and provide guidance on how to overcome the problems encountered.

This revision and workbook is recommended in conjunction with the following two textbooks: ‘One-dimensional finite elements: an introduction to the FE method’ [20] and ‘Computational statics and dynamics—an introduction based on the finite element method’ [22]. Nonetheless it can be easily used with many other classical textbooks on the finite element method [1, 8, 13, 26, 28, 37, 38]. The reader who is

more interested in the programming and implementation of the method is referred to the following book [15].

We look forward to receiving some comments and suggestions for the next edition of this textbook.

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