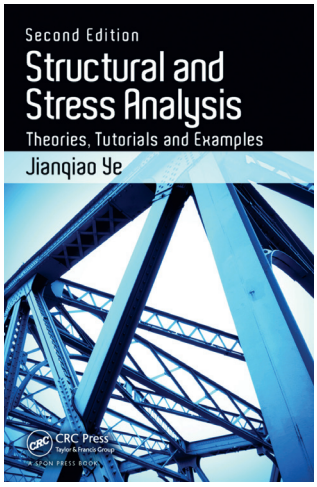
Review

Ian May finds this to be a useful book for undergraduate students in certain respects – its key points, conceptual questions and clear layout in particular – but feels it is let down by a lack of rigour.

Structural and Stress Analysis: Theories, Tutorials and Examples (2nd ed.)



Author: Jianqiao Ye
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This the second edition of the book and, in the preface to this edition, it states that the opportunity to include some more advanced material – plastic bending of beams, elastic analysis of plates, and an introduction to plate bending – has been taken. The author claims that the book is not another textbook that covers the theories, but aims to help students understand the physical significance of the results they are obtaining, which is an admirable objective.

Much of the material that a student of structural or civil engineering is likely to meet on an undergraduate course is covered, although there is a strong emphasis on elastic behaviour. There is just one chapter on elastic failure criteria and it is unfortunate that this has not been taken further to include plasticity, as much structural analysis and design now involves the non-linear behaviour of structures. There is also a brief mention of plastic behaviour in members in bending. Some of the definitions are somewhat casual, e.g. in Chapter 1, Introduction, the definition of a force includes "cause a body to move", rather than "causes a body to accelerate". Also, in an example in Chapter 1, a uniformly distributed load has been replaced by a point load without any explanation of how this was arrived at. Some students struggle with how and when distributed loads can be replaced. While accepting that a physical understanding of how a structure behaves is important, textbooks should also ensure they are rigorous in definitions and derivations. This lack of rigour, which occurs in a number of places in the book, is a major criticism of the book.

"THE EXAMPLES WERE WELL CHOSEN AND THE SOLUTIONS CLEARLY LAID OUT WITH GOOD EXPLANATIONS"

The layout of most of the chapters is very similar in that it comprises an overview of relevant theory, followed by a listing of key points, examples, conceptual questions and a "mini-test" which comprises problems for solution by the reader. The theory section varies in detail, e.g. in Chapter 2, Axial tension and compression, much of the theory is derived from first principles. However, in Chapter 10, Buckling of columns, the Euler load is stated without proof, although somewhat surprisingly the derivation is given in an example! The additional length of the text to include derivations would, in this reviewer's opinion, be well worth it. The key points section in each chapter gives a good review of the topic, although some of the points were a little vague; however, generally this was a useful section. The examples were well chosen and the solutions clearly laid out with good explanations. The conceptual questions could both form the basis of group discussions and serve as an aid to the reader's understanding of the topic. It would be useful if solutions to both the conceptual questions and the problems in the mini-test were available – possibly on a website.

In conclusion, this book has some good points, in particular the key points, the conceptual questions and the clear layout. It also covers much of the material likely to be covered in an undergraduate course. However, in this reviewer's opinion, in parts it lacks rigour and some basic derivations, which detract significantly from the book.

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Ian May was, until his retirement in 2011, Professor of Civil Engineering at Heriot-Watt University, Edinburgh. He has an interest in the teaching of structures and particularly in the intelligent use of computer software for structural analysis, and is the author and joint author of a number of papers on these topics. He also carried out research into a number of areas within the structural engineering field, publishing over 100 technical papers.