Book review

Structural and Stress Analysis – Theories, Tutorials and Examples 2nd edition

Jianqiao Ye, CRC Press, Boca Raton, FL, USA, 2015, ISBN 978-1-4822-2033-9, £50.99, 261 pp.

Structural analysis is a classical area of engineering that is common to several disciplines (civil, mechanical, aerospace, marine). The classical nature of the subject means that the available information (books, reports, articles) on structural analysis is extremely extensive and almost always treated in depth within each of its several domains (statics, dynamics, stability, non-linearities, damage).

This textbook covers the basics and fundamentals of structural analysis that are essential requirements for students. It does not provide deep analytical explanations and theoretical formulations, which are sometimes tedious and unnecessary for master student level requirements. The book provides the most relevant principles of structural mechanics (equilibrium, compatibility, constitutive laws) with simple illustrative examples that can easily be understood by students. Despite not being a book aimed at researchers, it is an excellent textbook for practising engineers.

The book covers mainly one-dimensional members (struts, beams, shafts) and some basic concepts regarding two-dimensional members (plates).

In relation to the nature of loading, the major contribution concerns the static behaviour of structures, but a final chapter on fundamental dynamics is also presented. Regarding structural failure, the book includes an introduction to plasticity (yielding), damage (elastic failure) and instability (elastic buckling). Therefore, several topics are dealt with in the 13 chapters of the book. After the Introduction (chapter 1), chapters 2, 3 and 4 give the basis of axial, torsion and bending deformation of structural elements, with emphasis on bending calculations (stresses and deflections) provided in chapters 5 and 6. The next two chapters (7 and 8) introduce the two-dimensional stress states of solid mechanics for more complex loading cases, while chapter 9 applies the criteria for elastic failure of materials. The last four chapters include other topics, such as elastic buckling of structures, energy methods, bending of thin plates and dynamics (vibration) fundamentals.

Besides the huge number of illustrative and worked examples, this book also provides readers with a résumé of each chapter (including the key points that should be understood), a set of solved problems and proposed examples, questions and mini tests, which are a great benefit for students using this textbook. In conclusion, this new edition is an excellent textbook recommended for university students and engineers attempting to understand the mechanical behaviour of structures, as it includes some tutorials, several illustrations and many solutions for everyday structural problems.

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