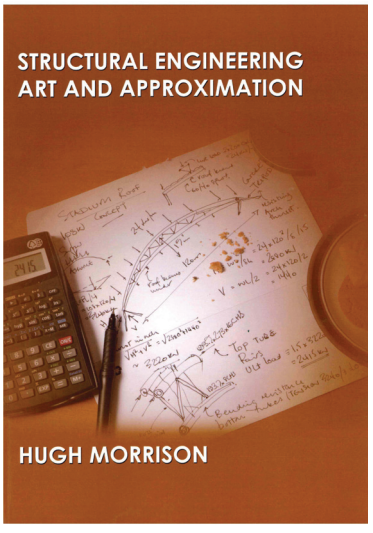
Review

Students and graduate engineers will find this book a useful resource to help them understand structural mechanics and solve design problems using hand calculations, says Nick Eckford.

Structural Engineering: Art and Approximation



Author: Hugh Morrison
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Part of the design engineer's expertise has to be that of being able to give a quick, ballpark answer that keeps activity rolling while a more accurate answer, if required, is sorted out. Such 'back of an envelope' designs do not rely on expertise with computers, but the designer's experience, judgement and the use of short cuts to establish a useable answer.

Engineers acquire their 'short cuts' by osmosis, working with more experienced colleagues, and finding out what works for them. Working on a design development against the clock, such as will happen when taking the Chartered Membership Examination, needs such skills.

This is all about understanding structural mechanics. Computerised solutions are impressive and accurate, but they are also literal. The answer is only as good as the information provided. It takes experience and judgement to assess that an answer is reasonable.

Structural Engineering: Art and Approximation is intended to fill the gap in students' and graduate engineers' knowledge by presenting conceptual design methods used by practising engineers in such a way that gives clarity to solving problems. In this book, Hugh Morrison considers the mechanics of structural engineering design in a way that considers it as an art in which the tools of the trade are analytical techniques.

Hugh starts with simple problems and, through the book, develops the concepts to cover trussed and framed structural forms, tensile structures, trusses, masonry and steel arches, shells, torsion structures, plate structures, diaphragms, structural insulated panels and then dynamics. For each he shows how they may be analysed and gives examples from the real world, including some failures and the reasons for them. Each chapter is preceded by an introduction and ends with a brief summary of the points made. All is well illustrated and explained, encouraging the reader to understand what is being said and to use similar techniques in their own work.

There is guidance on how to simplify analysis by using techniques of approximation so that a ready appreciation of what is required can be arrived at before sophisticated analytical techniques are employed.

There is no reference to design codes (EC or BS), as Hugh has deliberately concentrated on understanding the problem and solving it using hand calculations. He is showing how to put values on structural forms by understanding how they work.

Bearing in mind his target audience, I am surprised that there is no reference to *Reynolds's Reinforced Concrete Designer's Handbook*[1] or the *Steel Designer's Manual*[2], both of which are very useful sources of information for hand analysis.

I consider this a very good book for helping the target audience and also older engineers, and one that could well become a treasured reference volume.

You can see the author taking about his book on YouTube: www.youtube.com/watch?v=juabC4wWvds

References

► 1) Reynolds C. E., Steedman J. C. and Threlfall A. J. (2008) *Reynolds's Reinforced Concrete Designer's Handbook* (11th ed.), Abingdon, UK: Taylor & Francis

► 2) Davison B. and Owens G. W. (eds.) (2012) *Steel Designer's Manual* (7th ed.), Ascot, UK: Steel Construction Institute

Nick Eckford CEng, FIStructE, MICE
Nick Eckford has over 40 years in the industry behind him, mostly working in a small consulting practice, where he now acts as a consultant having retired. He reckons that the expertise gained from working in a contractor's estimating design office or a small consultancy serves you well.