

Book review

Bridge Deck Analysis 2nd edition

Eugene J. O'Brien, Damien L. Keogh and Alan J. O'Connor (eds),
CRC Press, Taylor & Francis Group, Boca Raton, FL, USA, 2014,
ISBN 978-1-4822-2723-9, £127.00, 351 pp.

This is the second edition of the informative and practical book first published by E. O'Brien and D. Keogh in 1999. It has been updated and extended to reflect changes in bridge analysis methods arising from changes in design standards, computing techniques and recent research. It also includes new material on reliability theory arising from the research undertaken by Alan O'Connor at Trinity College Dublin.

The authors have recognised that there have been some significant advances in the methods adopted in bridge analysis, particularly the use of three-dimensional (3D) finite-element programs compared to planar grillage modelling. Also the preferred methods of construction using integral bridge solutions for small and medium spans mean that more bridge layouts are structurally indeterminate and rely on more complex modelling.

The book is an excellent introduction for new practitioners and provides a succinct overview of typical bridge construction types and the principles of their behaviour. It proceeds to describe the principal types of loading and how these are modelled on various deck types. These methods are illustrated with numerous examples and explanatory figures. The presentation is readable, clear and informative.

The book largely adheres to its title in that it concentrates on the analysis of bridge decks, but understandably includes the analysis of some forms of substructures and abutments, as modern requirements demand that integral bridge layouts are adopted. The analysis of such bridges requires

that an overall understanding of structural frame behaviour is fully appreciated.

Many examples are given that make reference to modern codes of practice, especially Eurocodes and those of the American Association of State Highway and Transportation Officials (AASHTO), but on the whole the book concentrates on the design principles rather than specific code requirements. This is understandable and allows the reader to acquire the core skills needed to analyse many recognised conventional bridge types, especially in reinforced and prestressed concrete.

The text includes many examples of sound, recognised practice adopted by bridge engineers that can assist with better modelling of structural effects that are not always be determined precisely. It also gives advice on alternative approaches that may be used by designers or assessors. However, the authors note that every reader should use their own judgement to decide the most appropriate method to be adopted in a given situation. A case in point might be the use of run-on slabs in integral bridge construction and the compaction of backfill behind abutments. These topics can be treated in a number of different ways and so actual solutions should be justified on the specific features of a scheme.

A book of this type risks being accused of being both superficial to the expert and overly complex to the graduate. This is not the case. The chapters on behaviour and modelling of slab decks and the probabilistic assessment of bridge safety (reliability) ensure that all readers will gain or confirm their broader knowledge and understanding of the subject, and can use the extensive references to explore specific topics in further detail. The book is a worthy successor to Hambly's *Bridge Deck Behaviour*, with contemporary and practical content.

Richard Cooke