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Book review

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Book review

Seismic Design of Buildings to Eurocode 8, 2nd edition

A. Y. Elghazouli (ed.). CRC Press, Boca Raton, FL, USA, 2017,
ISBN 978-1-4987-5159-9, £99.00, 368 pp.

Eurocode 8 (EC8) was first published in 2004 and, at the time, was considered state-of-the art as it included modern seismic design concepts such as energy dissipation due to local and global ductility, and techniques such as non-linear static 'pushover' analysis. Unlike US codes, the Eurocodes have no side-by-side commentary and thus EC8 Part 1 (EC8-1) was duly followed by the ICE *Designers' Guide* in 2005, the first edition of the *Seismic Design of Buildings to Eurocode 8* in 2009, the IStructE/AFPS *Manual* in 2010, and CRC Press's *Concrete Buildings* in 2015. As it is generally considered that seismic design is currently a work in progress (for example, EC8-1 was amended in 2009, 2011 and 2013), the publication of this updated and expanded second edition, which includes for all building material types, is timely.

Each chapter of the book is the work of subject matter expert contributors from academia and industry. Many of the contributors/internal reviewers have worked in some capacity on either EC8 itself, the ICE's *Designers' Guide*, the IStructE/AFPS' *Manual* or other specialist topic books, as well as on this book's first edition. Given this impressive pedigree, practitioners can safely assume that, technically, it has appropriate provenance.

As its title suggests, the book is limited in scope to buildings. It provides background information on their seismic design and offers discussion and commentary, mainly on EC8-1, but also for foundations on EC8 Part 5 (EC8-5). While the book does not specifically cover bridges, retrofitting,

silos, towers and so on, there are some isolated references to these structures/activities, and much of its content will anyway be generic.

The book is divided into 12 chapters and a comprehensive summary of each of these is provided in Chapter 1 (Introduction). Chapter 2 describes the earthquake hazard both generally and as defined by the two spectra within EC8-1, one for high-seismicity areas of southern Europe (type 1) and the other for less active areas (type 2). Chapter 3 (Structural Analysis) is clear and well-written and introduces an example building project that is then also used in subsequent chapters.

The content of Chapters 4 to 10 mirrors that of the same section numbers within EC8-1, which is of benefit to busy practitioners. The three ductility classes, DCL, DCM and DCH, which are applicable to all material types except masonry and the ground, are introduced. Generally, DCL structure members can be designed to the parent Eurocode (i.e. EC2, EC5 etc. depending on material type) without further recourse to EC8-1. DCM structures are likely to form the most common group designed to EC8-1, and their ductility detailing at critical regions where plastic hinges are expected to form is described. For concrete structures (Chapter 5), such detailing is provided in both prescriptive and numerically based form, in some depth. For steel structures, ductility detailing still partially relies on recent laboratory testing and research, noting that this is a significant interest area for the book's editor. For timber structures, ductility is restricted to joints and metal connections, and these generally need verification by testing.

Chapter 10 covers passive protection strategies for reducing seismic demand; that is, both seismic isolation of a structure's primary mass from the source motion, which is included within EC8-1, and distributed supplemental damping over the height of a structure, which is not included within EC8-1.

Chapters 11 and 12 cover shallow and pile foundations respectively. Because of the non-linear behaviour of ground, these chapters wisely advocate that designers should have a good understanding of the processes involved and a suitably cautious attitude. Liquefaction guidance is dealt with in some depth and some information on displacement-based design is provided even though that topic is not discussed within EC8-5.

This review has mainly considered the book's context, authorship, readability, scope and referencing worth for busy practitioners. The book's publication is timely and its contributor list is impressive. For connoisseurs of civil engineering literature, the book's earlier chapters, from the introduction through to basic seismic design principles, are most enjoyable. For practitioners, it provides subject matter expert guidance on the necessary design algorithms within EC8-1 and EC8-5 to confidently enable buildings to withstand or at least survive seismic actions. This book will surely be helpful, for example, in the event of seismic actions to preserve a culturally significant building or to prevent the collapse of a hospital. Its publication can undoubtedly be considered a worthwhile endeavour and civil engineers at all grades who are involved in seismic design will find it a handy and well-used reference.

Phillip G. Thurlow