

## BOOK REVIEWS

Title: "Dynamic Behaviour of Concrete Structures - Report of the RILEM 65 MDB Committee" being vol. 13 in the Developments in Civil Engineering Series

Editor: G. P. Tilly

Publisher: Elsevier Science Publishers, Amsterdam, 1987

Price: A\$151.00, clothbound

### Chapter Headings:

1. Introduction to the Dynamics of Structures in Relation to Design
2. Numerical Analysis of Structural Dynamics
3. Loading and Effects
4. Techniques and Experimental Work
5. Structures
6. Recommendations

The first two chapters deal with the differences between static and dynamic problems and consider the dynamic behaviour of single and multi-degree of freedom systems, illustrated by a number of worked examples. Chapter 3 gives a general account of loading and effects with particular reference to wind, wave and seismic loadings.

Chapter 4 discusses a range of topics beginning with the techniques of data acquisition and signal analysis. Laboratory techniques are discussed but there is more emphasis on field work and methods of exciting structures. Other sections deal with beam tests, vector response diagrams, seismic loading of components, structural models of offshore structures and wind tunnel testing.

Chapter 5 contains information about the dynamic behaviour of different types of concrete structures. This touches on dynamic loadings, response and design philosophies. Typical examples of the dynamic characteristics are given where possible, covering items such as natural frequencies, damping and response to loading. The structures considered include: bridges, buildings, offshore platforms, offshore cranes, dams, wind turbines, chimneys and TV towers, power transmission towers, and bell towers.

The conclusions from the earlier chapters are brought together in the last chapter, along with typical values of dynamic characteristics and appropriate recommendations.

This is a very good reference on the subject, especially in the last two chapters. There are a large number of references to research and testing carried out in Europe - which will be of interest to New Zealand engineers, though not all of them will be readily available - but there

are very few references to work that has been carried out in other parts of the world. Presumably this comes about because all the authors come from Western Europe.

Chapter six on its own is quite valuable in that the summary of the previous chapters also includes suggestions for the likely damping and lowest frequency of response.

In his preface, the editor states that .. "It is intended that this publication should be useful to designers, researchers and students. It is hoped that the unique mix of disciplines and structures will provide an invaluable source of information which will remain relevant for many years." The book should be able to match these intentions even though its database is restricted to European experience.

The book is well produced and deserves to have a wide readership though the price may count against this. Its value and the extent of the information contained in it can best be judged by browsing through it.

Title: "Analysis of Dynamic Effects on Engineering Structures" being volume 16 in the Developments in Civil Engineering Series.

Authors: M. Bata and V. Placy

Publisher: Elsevier Science Publishers, Amsterdam, 1987

Price: A\$136-75, clothbound

### Chapter Headings:

1. Introduction
2. Basic relations of natural vibration
3. Driving forces acting on engineering structures
4. Analysis of forced vibration
5. Analysis of the vibration of buildings

Chapter 1 is basically introductory, explaining the subject matter and purpose of structural dynamics and discussing the systems of coordinates and degrees of freedom. The second chapter deals with the basic relations governing the natural vibration of systems with single and multi-degrees of freedom and also with continuously distributed mass. Chapter 3 discusses the forces that act on structures, both deterministic and random. The discussion of random forces includes an outline of the principles of mathematical statistics and the theory of stochastic processes. The concluding part of the chapter explains how the exciting forces are determined by calculation and experiment. The analysis of the forced vibration of the systems discussed in chapter 2 are further discussed in chapter 4. The conclusions and results of the first four chapters are applied to the analysis of the vibration of buildings in chapter 5 and cover both natural and forced vibration.

This book is more a reference work than a textbook, though it does contain some detailed development of the subject matter along with background material. Much of the material covered in chapter 2 should be familiar to readers who have studied structural dynamics at undergraduate level. Part of the theory in chapter 3 may seem to be heavy going but this is required in sufficient detail to give an adequate understanding of the effect of random forces such as earthquakes or those generated in machinery such as a large press.

Readers interested in building dynamics will find the material in chapter 5 familiar in parts but still interesting. The analysis of plane frame structures is discussed in some detail, along with 3-dimensional frameworks. Empirical formula for the determination of the fundamental period of natural vibration of a building are also given.

The book contains a large amount of mathematics, generally using matrix notation. There is a large list of references but unfortunately many will not be available in English translation.

Title: "Earthquake Engineering - Fifth Canadian Conference"

Editor:

Publisher: A. A. Balkema, Rotterdam, 1987

Price: US\$70.00

This book is the proceedings of the Fifth Canadian Conference on Earthquake Engineering and as such contains the text of the five keynote addresses given to the conference in addition to the papers that were presented.

The keynote addresses were on the topics of: a seismic design strategy for hybrid structures; the estimation of ground shaking caused by earthquakes; earthquake analysis, design and safety evaluation of concrete dams, specification of control motions for embedded foundations, and structural damage due to the 1985 Mexico earthquake.

The main topic areas covered by the presented papers include:

- . Analytical Procedures (6 papers),
- . Response Analysis and Design of Building Structures and Components (14 papers),
- . Response Analysis and Design of Non Building Structures and Components (8 papers),
- . Nondeterministic Analysis (3 papers),
- . Soil-structure interaction (11 papers)
- . Soil Stability (8 papers),
- . Special Structures and Critical Facilities (9 papers),

- . Lifeline, Utility, Telecommunication, and Transportation Systems (3 papers),
- . Ground Motion, Seismicity and Seismic Risk (8 papers),
- . Seismic Codes and Standards (5 papers), and
- . Experimental Methods and Tests (13 papers)

The various papers in the proceedings cover a very wide range of topics and subject matter, though the majority of papers arise from university research in Canada and to a lesser extent the U.S.A and Europe; there are few case studies and other papers written by practicing engineers.

With a large volume such as this (882 pages) and covering 5 keynote addresses as well as 88 papers, it is not possible to give more than a general review of the book. Each of the keynote addresses is worth reading for its own sake in that they report on the present "state-of-the-art". This is particularly true of the report on the 1985 Mexico Earthquake with pictures that are a graphic reminder of the need for earthquake engineering.

The papers on response analysis and design range over topics such as boundary element analysis for a reservoir, inelastic response spectra, the influence of architectural configuration, friction dampers, steel and concrete frames, panel wall systems and arch and earth dams.

Soil stability and soil-structure interaction are covered by papers on the effects of foundation flexibility, surface footings in sand, base isolation, pile foundations and soil liquefaction. Among the papers on special structures and critical facilities is one on the seismic risk at Vancouver Airport where ground liquefaction could occur under the runways and elsewhere!

The Ground Motion and Seismicity papers discuss the effects of earthquakes in various parts of the world.

As might be expected, the Experimental Work section has papers that describe tests on concrete beams and columns, as well as a paper on the shake table tests of a six storey R/C frame with a setback.

Taken together with the proceedings of the 1986 European Earthquake Conference and the 1987 Pacific Conference on Earthquake Engineering, this book of Canadian conference papers helps to fill out our knowledge on the present state-of-the-art relating to the analysis, design and safety aspects of earthquake resistant structures.