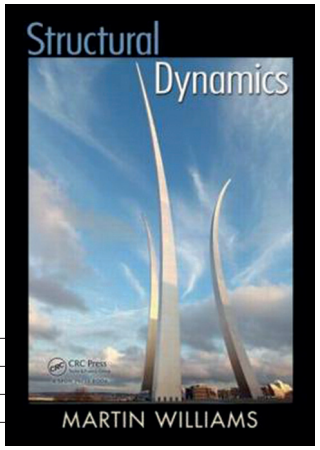
Review

Sonja Abhyankar finds this to be a solid, concise and well-structured introduction to structural dynamics, which will be of use to both undergraduate students and practising engineers new to this complex subject.

Structural Dynamics



Author: Martin Williams
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Modern structures are becoming lighter and hence more prone to vibration; construction in highly seismic regions is more and more common; and the construction of very tall structures which experience large excitations due to wind loads is increasing. In parallel, the tools we have for dynamic analysis are becoming more advanced and more widely available. The subject of dynamics in structural and civil engineering is therefore increasingly important and applicable in the world of the consulting engineer.

In this book, Martin Williams presents the fundamental principles of structural dynamics in a clear and well-structured manner. He provides an accessible introduction to this complex subject, which is primarily intended for structural and civil engineering undergraduates. The book would also serve as a useful introduction to practising engineers who may not have covered these topics as a student.

Chapter 1 introduces dynamic systems by explaining the basic concepts and describing real-world examples to give context and purpose to the topic. The book then gradually builds in complexity, first describing single-degree-of-freedom (SDOF) systems in Chapter 2, then multi-degree-of-freedom (MDOF) systems in Chapter 3 and continuous systems in Chapter 4. In each case, the free vibration characteristics are described along with methods to calculate a structure's response to a variety of forcing functions.

"MARTIN WILLIAMS PROVIDES AN ACCESSIBLE INTRODUCTION TO THIS COMPLEX SUBJECT"

The final two chapters of the book cover more advanced topics such as non-linear dynamics, Fourier analysis and random vibrations. Suggestions for further reading are given at the back of the book, and these are helpfully organised by the chapter topics.

Each chapter is well structured, beginning with a list of the learning objectives for the section. The theoretical concepts are presented in a logical order with several worked examples interspersed throughout. The chapters each end with a concise summary of the key points which gives a useful overview of what has been learnt. In addition, each chapter contains a selection of tutorial problems which allow the reader to test their understanding of the theory covered. Hints and answers to these problems are given at the back of the book.

As more difficult concepts are introduced, they are often related back to, and expand on, the more simple examples from previous chapters. Providing linkages between different concepts in this way enhances the reader's understanding and Williams implements such techniques well throughout the book.

The study of structural dynamics requires knowledge and understanding of a variety of mathematical concepts and techniques. Throughout the main text of the book, Williams achieves an impressive balance of providing enough mathematics to adequately explain the physical concepts, without unnecessary complexity that could confuse or intimidate the reader. Equations are presented throughout the text at relevant points, with the concepts often first described qualitatively to build up the reader's understanding and ensure that they can see how the equations have been derived. Further background mathematics is included in the appendices for students looking for additional depth.

Overall, this book provides a solid and concise introduction to structural dynamics and will be very useful for people who are studying this topic for the first time. The writing style and structure of the chapters make it very easy to follow as a complete text, but the style also enables the reader to dip into individual topics. This makes the book very useful both to students and as a reference text.

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