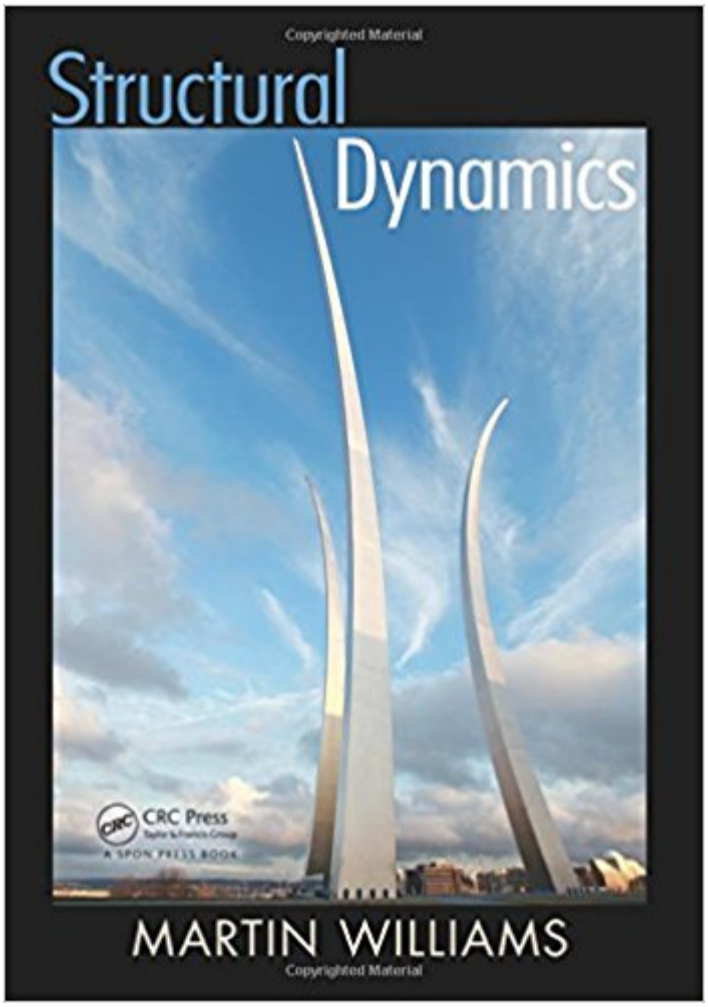
Structural Dynamics



Synopsis

Dynamics is increasingly being identified by consulting engineers as one of the key skills which needs to be taught in civil engineering degree programs. This is driven by the trend towards lighter, more vibration-prone structures, the growth of business in earthquake regions, the identification of new threats such as terrorist attack and the increased availability of sophisticated dynamic analysis tools. Martin Williams presents this short, accessible introduction to the area of structural dynamics. He begins by describing dynamic systems and their representation for analytical purposes. The two main chapters deal with linear analysis of single (SDOF) and multi-degree-of-freedom (MDOF) systems, under free vibration and in response to a variety of forcing functions. Hand analysis of continuous systems is covered briefly to illustrate the key principles. Methods of calculation of non-linear dynamic response is also discussed. Lastly, the key principles of random vibration analysis are presented Ã¢â ¬â œ this approach is crucial for wind engineering and is increasingly important for other load cases. An appendix briefly summarizes relevant mathematical techniques. Extensive use is made of worked examples, mostly drawn from civil engineering (though not exclusively Ã¢â ¬â œ there is considerable benefit to be gained from emphasizing the commonality with other branches of engineering). This introductory dynamics textbook is aimed at upper level civil engineering undergraduates and those starting an M.Sc. course in the area.

Book Information

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Customer Reviews

"Martin Williams has come up with a novel way of presenting the theory and underlying principles of structural dynamics. Mathematical derivations are kept as simple as possible and are fully supported with a wealth of self-explanatory problems and solutions. This is an essential read for undergraduate and graduate students of civil engineering."Ã¢â ¬â ¢Dr. Theodore Karavasilis, University of Warwick, UK "This book provides students with an in-depth knowledge of structural dynamics without boring them! Each chapter sets out clearly the learning objectives and the theory is illustrated with many clear and diverse examples. The commentaries are interesting to read and provide further insight into the topics covered."Ã¢â ¬â ¢Professor Tiziana Rossetto, University College London "I have no doubt that the book will be of use not only to advanced university level students but also to practitioners (including myself!) tackling engineering problems in the realms of structural dynamics, who will use the book not only to refresh and confirm their memory and understanding of this complex subject, but also to stretch them into a few corners of it that they might not have previously considered."Ã¢â ¬â ¢Edmund Booth, Consulting Engineer, UK" Ã¢â ¬Â¦ I feel that this book gives [a] clear explanation of the fundamental principles and theory, which is achieved from the authorÃ¢â ¬â„¢s many years of teaching and research on structural dynamics."Ã¢â ¬â ¢Tianjian Ji, University of Manchester, UK "I really appreciated the clear and simple way arguments are introduced, which is crucial for undergraduate students who are not acquainted with structural dynamics and face the topic for the first time."Ã¢â ¬â ¢Giuseppe Abbiati, ETH Zurich" Ã¢â ¬Â¦ this book provides an excellent introduction using a simple yet rigorous approach."Ã¢â ¬â ¢Andrei M Reinhorn, University at Buffalo, New York "Martin (engineering, Univ. of Oxford, UK) has published extensively on earthquake engineering and structural dynamics. In this succinct volume, he describes the fundamentals of structural dynamics. All the basics are covered: single-degree-of-freedom and multiple-degree-of-freedom systems, various damping models, continuous systems, nonlinear systems, numeric solution methods, and Fourier analysis. Short appendixes are provided to make students aware of the mathematics necessary for structural dynamics, covering topics such as differential equations, the Laplace transform, and eigenvectors and eigenvalues. Compared to other texts on the topic, this book foregoes many advanced topics, such as static condensation, earthquake codes, and finite element analysis. The book presents an intriguing option for a student textbook, as the fundamental concepts of structural analysis arepresented in a straightforward manner at a third of the price of more traditional texts. As a library volume, it lacks the detail of the other texts but could be useful for students, practitioners, and researchers looking to brush up on the basic theories of structural dynamics."Ã¢â ¬â ¢CHOICE, December 2016

Martin Williams is a professor in the engineering department at the University of Oxford. His research interests cover a wide range of structural dynamics problems, including earthquake engineering, hybrid test methods, dynamics of historic masonry structures and suspension bridge dynamics.

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