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Book review

J.P. Wolf, A.J. Deeks, Foundation Vibration Analysis: A Strength of Materials Approach, Elsevier, Amsterdam, ISBN 0-7506-6164-X, 2004 (pp. xiii + 218, US$59.95, £40).

The analysis of the vibrations of foundations is becoming an increasingly important feature of foundation design especially with the recent and planned construction of offshore wind farms. In this case the individual wind turbines are subjected to a variety of different dynamic forces that contribute to the vibration of the foundation system. The analysis of such structures in a complex stratified foundation material is by no means a simple task. Rigorous solutions are only usually available for simple situations. Often recourse is made to simplified approximate forms of solution, like the lumped parameter approach, which provides answers to a sufficient degree of precision suitable for engineering design purposes.

This book describes how a range of complex foundation vibration problems can be solved by using a 'new' simplified approach which should prove to be an advantage over the crude lumped parameter models incorporating springs, dashpots and plastic sliders. Here Wolf and Deeks use a truncated cone model to provide a 'strength of materials', approach which is 'familiar to structural engineers' to provide solutions for geotechnical engineers who have to solve foundation vibration problems for complex scenarios involving embedded foundations in stratified soils.

Although the truncated cone model is not new, having been developed in the early 1940s, it has only been over the last few years that the model has developed sufficiently to solve complex problems. Wolf has been at the forefront of these developments and has written numerous publications on the subject. In a previous book (Foundation Vibration Analysis Using Simple Physical Models, Prentice Hall, 1994) Wolf examines the truncated cone model in the light of different problems and modes of excitation alongside convention lumped parameter models. The present book, however, concentrates exclusively on the development of the truncated cone model and how it can be applied to increasing complex situations in a practical way. The result of this is that this book is completely self-contained and should prove to be far more useful to practising geotechnical engineers than its predecessor.

The authors provide short synopses of the contents of each chapter as well as giving a thorough resumé of the book contents in chapter 1 where they define the fundamental problems. Chapter 2 introduces the cone model concept before the mathematical derivations are developed in succeeding chapters. Chapter 3 develops the cone model for a foundation on the surface of a homogeneous half-space. Chapter 4 goes on to develop the cone model to deal with a foundation on the surface of a layered half-space by accounting for refraction and reflection at the layer boundaries. Chapter 5 then provides an extension of the cone model to deal with an embedded

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foundation in a layered half-space. A thorough examination of the accuracy of the cone model with respect to more rigorous solutions is given in chapter 6 for several situations. Finally several practical foundation problems are examined to show the applicability of the cone model for solving problems of foundation vibration in complex situations.

A special feature of the book is its link to the "Deeks" website from where the executable program CONAN can be downloaded to enable users to perform their own Cone Analysis of foundation vibration problems. The book also provides a series of MATLAB routines to allow users to develop their own solutions for specific problems. All these programs are fully documented in the extensive appendices.

I expect this volume to become a landmark textbook on dynamic soil structure interaction. It should be an important book for both practitioners as well as being a core book for graduate civil engineering courses in Soil Dynamics. Inevitably the cone model will be further developed so as to apply to more complex and realistic situations. It is to be hoped that the cone method will be developed to deal with piled foundations and the non-linear behaviour of foundations materials and that these will be included in future editions.

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