Chapter 9 covers signal analysis and identification of vibration causes: vibration trends and baselines, FFT spectrum, rotor orbit trajectories, cascade plots, wavelets, chaos, symptoms and identification of vibration causes: rotor mass unbalance, self-excited instability, rotor-stator rub, misalignment, resonance, mechanically loose connections, cracked shaft, rolling element bearing, gears and vane/blade passing effects.

The last part of the book contains three chapters mostly devoted to case studies. In chapter 10, problems on site due to rotor unbalance and critical speeds are presented with the solutions applied. They concern a high-pressure turbine passing through a critical speed and two boiler feed pumps with a critical speed in the operating speed range.

In chapter 11, the author presents three case studies concerning self-excited vibration: use of swirl brakes for stabilizing a 1300 MW unit, steam whirl due to bearings unloaded by nozzle forces in a 650 MW unit and oil-whip/steam-whirl "duet" created by misalignment in a 430 MW unit.

In the last chapter, the author presents additional vibration cases and some special topics: vertical-rotors, impact tests for diagnoses, bearing looseness effects, tilting-pad versus fixed-surface journal bearing, base motion excitation from earthquake and shock, parametric excitation for non-symmetric shaft stiffness, magnetic bearings and rotor balancing with the influence coefficient method.

A floppy disk for PC's is given with the book. It contains three programs. BearCoef is a library of tables for dimensionless hydrodynamic bearing stiffness and damping coefficients. A spreadsheet allows an easy use of these tables. The RDA and Balance directories contain DOS programs and examples (data and results).

One slight criticism by this reviewer is that he would have liked some information on the Campbell (interference) diagram which is useful when damping is low.

Whatever the case, it is clear that this book benefits from Dr Adams' very long experience (14 years in industry) prior to becoming a professor and more than 20 years as consultant and professor. In particular, he has been involved in all the cases studies presented.

In conclusion, this clearly written book will be useful for graduate students, professors and engineers and the reviewer highly recommends it for those concerned with rotordynamics.

M. LALANNE

HANDBOOK OF VISCOELASTIC VIBRATION DAMPING, 2001, by D. I. G. Jones. Chichester: John Wiley & Sons, Ltd. xi + 391pp. Price £75.00. ISBN 0-471-49248-5

The author's Preface states: " … Attempts are often made to apply viscoelastic materials for the solution of practical engineering vibration and noise control problems … It is essential to have an adequate understanding of viscoelastic materials in order to achieve success … It is the purpose of this handbook to introduce readers to the fundamentals of damping by means of polymeric viscoelastic materials, including means for characterising material behaviour under dynamic strain, means for obtaining usable mathematical models for application in finite element or other computational processes, means for measuring the relevant parameters for any specific polymer, and means for selecting and designing effective treatments".

From the Preface, as well as from the text, it is clear that this is not what one would typically consider a handbook that provides terse information one can readily access without reading several of the book's sections. Rather, this book is more nearly an instructional text that begins with basics and progresses to more complex topics. It is in

essence a collection of information and advice culled from the author's 40 years of work in the area of damping.

The first chapter, "Introduction to Damping", begins with a brief historical review of damping technology and with short answers to such basic questions as "What is vibration?", "What is damping?", and "What is vibration control?" It continues with classical textbook discussions of the responses of simple systems with viscous damping and briefly touches upon non-linear material damping, friction damping, and damping due to sound radiation and air pumping.

The second chapter, entitled "Modeling the Dynamic Mechanical Behaviour of Viscoelastic Materials", deals with linear viscoelastic behaviour in the time and frequency domains. It introduces complex moduli and classical models, and discusses the fractional derivative model and related empirical modifications. The relatively short third chapter, "The Effects of Temperature and Frequency on Complex Modulus Properties", mentions strain amplitude effects briefly and then focuses on equivalent effects of temperature and frequency changes on the properties of certain materials at small amplitudes.

Chapter 4, "Measurement of complex Modulus Properties", presents general considerations for evaluating these properties from measurements on various single-degree-of-freedom systems and discusses in considerable detail the widely used measurement approach using vibrating beam configurations. The fifth chapter, "Numerical Analysis of Measured Complex Modulus Data", is perhaps the most useful one of the book, in that it presents information and insights that are not readily available elsewhere. It addresses identification of errors in test data using the "wicket plot", discusses development of temperature–frequency nomograms that facilitate the display and use of complex modulus data, and provides guidance concerning the statistical analysis of errors. Chapter 6, "The Complex Modulus Behaviour of Typical Polymeric Materials", in essence illustrates applications of the methods of the foregoing two chapters to several materials. It consists largely of examples of test data obtained on a number of materials and of evaluation of the material properties based on these data.

The seventh chapter is entitled "Harmonic and Non-Harmonic Response of Simple Viscoelastic Systems". It begins with a discussion of the response of a single-degree-of-freedom system to sinusoidal excitation, indicates how the system's damping may be determined from this response, and illustrates how this approach may be extended to multi-modal systems. It presents a summary of how Fourier transforms may be used to evaluate the responses of simple systems in the time and frequency domains and indicates some of the related numerical difficulties and errors. It also addresses the calculation of creep-recovery and relaxation responses of viscoelastic specimens and concludes with some illustrative calculations of the responses of systems with multiple degree of freedom.

Under the heading "Controlling Vibration using Viscoelastic Damping", Chapter 8 deals with beams that are fully covered by free-layer and constrained-layer damping treatments and discusses approaches to analyzing one-dimensional and two-dimensional flexural systems with partial damping treatment coverage. It also describes the analysis and design of tuned dampers and of vibration isolators that incorporate viscoelastic materials. Chapter 9 consists of a listing of selected MATHCAD computer programmes for some of the calculations discussed in the earlier chapters, and chapter ten consists of a brief discussion of units and dimensions.

It is unfortunate that the presentation in this book is somewhat uneven. The early portions are so elementary that they are not likely to be of benefit to anyone who would be interested in the book's topic, whereas some of the later portions presuppose considerable related background on the part of the reader. Many equations that may readily be derived by a reader with some knowledge of classical vibration analysis are developed in

considerable detail, whereas others whose origin is not so obvious are simply stated. Many pages are taken up by tabulations of specific measured and calculated illustrative data, which are also presented in graphical form. Some information, such as a "List of some polymer types", a list of some providers of complex modulus test systems and services (many of whom are not readily available to the general public), and a discussion of the basic units in classical mechanics, in rather useless or irrelevant.

Although the author has been careful to present the technical discussions accurately, they are often difficult to follow because some definitions and explanations needed to understand them appear only in later portions of the text. Attention to editorial detail has been less careful. There are numerous errors in symbols, in references to equations, and in references to figures. The axes of many figures are labelled in ways in which the variables and/or the units are not clearly identified, and some figures are mislabelled.

In spite of the aforementioned shortcomings, a reader who has some background in vibration analysis in all cases should be able with some care and patience to determine the author's intents. At any rate, no other book provides a better overview of viscoelastic damping and the related caveats.

E. E. UNGAR