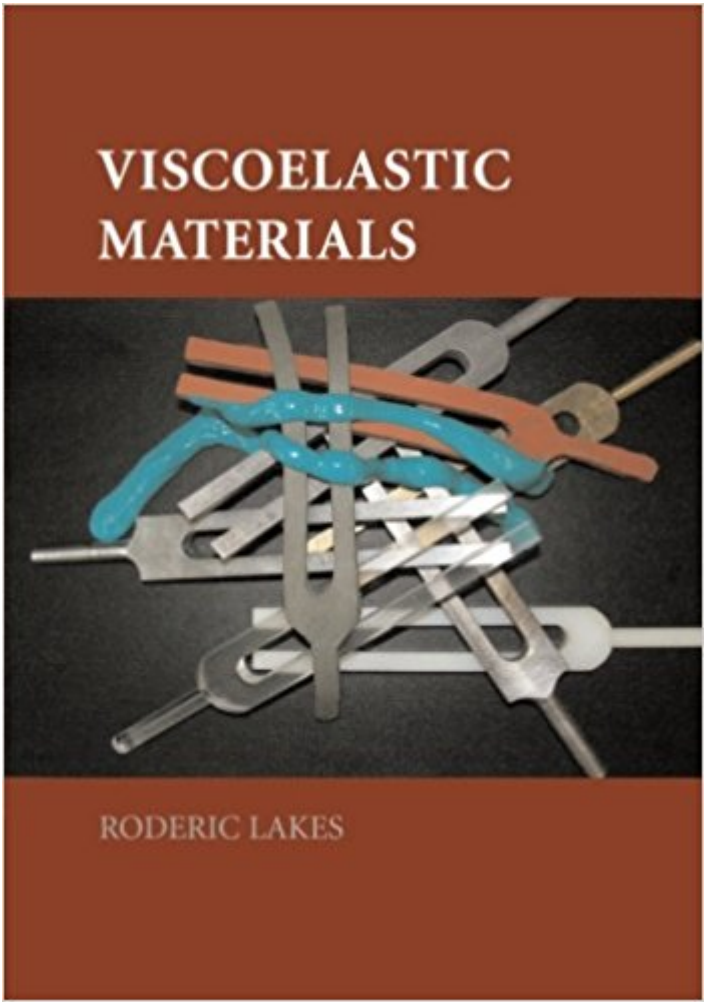
Viscoelastic Materials



Synopsis

Understanding viscoelasticity is pertinent to design applications as diverse as earplugs, gaskets, computer disks, satellite stability, medical diagnosis, injury prevention, vibration abatement, tire performance, sports, spacecraft explosions, and music. This book fits a one-semester graduate course on the properties, analysis, and uses of viscoelastic materials. Those familiar with the author's precursor book, Viscoelastic Solids, will see that this book contains many updates and expanded coverage of the materials science, causes of viscoelastic behavior, properties of materials of biological origin, and applications of viscoelastic materials. The theoretical presentation includes both transient and dynamic aspects, with emphasis on linear viscoelasticity to develop physical insight. Methods for the solution of stress analysis problems are developed and illustrated. Experimental methods for characterization of viscoelastic materials are explored in detail. Viscoelastic phenomena are described for a wide variety of materials, including viscoelastic composite materials. Applications of viscoelasticity and viscoelastic materials are illustrated with case studies.

Book Information

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Customer Reviews

Understanding viscoelasticity is pertinent to design applications as diverse as earplugs, gaskets, computer disks, satellite stability, medical diagnosis, injury prevention, vibration abatement, tire performance, sports, spacecraft explosions, and music. This book fits a one-semester graduate course on the properties, analysis, and uses of viscoelastic materials.

Roderic Lakes is a Distinguished Professor in the Department of Engineering Physics at the University of Wisconsin-Madison. He is a Fellow in the American Association for the Advancement of Science (AAAS) and a Fellow in the American Society of Mechanical Engineers (ASME). He has won numerous teaching awards and is the author and co-author of more than 194 archival publications, three books, including Viscoelastic Solids and Biomaterials (2nd and 3rd editions, with J. B. Park), and fourteen book chapters. The author's articles in Science and Nature are of particular note as they have led to numerous synergistic publications in a variety of disciplines.

I enjoyed reading this book. The text is clearly written and contains a great deal of practical information about viscoelastic materials and their characterization. While some topics are written with graduate students in mind -stating results and omitting crucial derivations, or presuming familiarity with elasticity and continuum mechanics- the treatment of other topics starts from the elementary and can be easily followed by undergraduate-level readers. Yet some topics, like the propagation of harmonic waves, are incomprehensively simplified by treating only the case of viscoelastic materials with negligible damping, apparently to avoid the use of complex algebra. I particularly disagreed with the treatment of Poisson's ratio of viscoelastic materials; where the author uses the inconsistent assumptions of a contant bulk modulkus and a time-dependent Poisson's ratio to conclude that the Poisson's ratio of a viscoelastic material, derived from a relaxation test, differs from that derived from a creep test.

An excellent and comprehensive book in the theory of viscoelasticity written by Prof. Lakes. It includes all the required information and techniques of material characterization.

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