vestigation of fracture strength considers ideal cleavage. This progresses to real cleavage factors, which proceed along characteristic planes of the lattice structure. The local fracture planes are highly reflective and contribute to a shiny surface. Intercrystalline fracture is then considered, which may be caused by a weakened phase of bonding between these grains. Cleavage fractures are next considered and are typically recognized by small values of fracture toughness and Charpy energy.

The concluding chapter reports on elements of fracture mechanics. The six different current inspection techniques are considered. This follows with cracks emanating from notches, crack growth analysis for cyclic loading, crack initiation under large scale yielding. This continues with an interesting discussion of stable crack growth following ASTM standards for testing and thickness as a design parameter. The idea for leak before break for pressure vessels are glossed over. The chapter concludes with crack instability in thermal or residual stress fields.

Appendix A reviews elements of solid mechanics and theory of elasticity, elastic deformation, and plastic deformation of materials. The elastoplastic and plasticity plus limit analysis is briefly studied. Appendix B contains analytical solutions for an internal crack plus solutions at an internal crack in the plane state and antiplane stresses. Appendix C has tables for stress intensity factors for a number of different cracks. Appendix D reports on the invariance of the J integral plus a short review of energy balance considering crack growth in an elastic body. Appendix F studies elements of elastodynamics and the formulas associated with it. The concluding appendix presents a short table of conversion factors.

One must read this book carefully because of its mathematical content. The reviewer would have preferred a table of nomenclature as well as a deeper insight into the use of finite elements in calculating crack growth and separation. This book is recommended to those interested in the applied mechanics aspect of fracture mechanics.

Random Vibration of Elastic Systems, J. V. Bolotin, Martinus Nijhoff Publishers, The Hague, Netherlands, 1984, 468 pages.

The book is written by a "master" in the theory and art of random vibration. The latter is fundamental in the analysis of road transportation vehicles subjected to vibration caused by rough surface, aircraft structures acted upon by wind and induced vibration of heat exchanger due to fluid flow, etc. This book comprises a number of experimental and theoretical phases of random vibrations. As stated by the author, "This book considers systematically the problems of the theory of random vibrations and the methods of solving them with particular attention devoted to continuous systems . . . This book sums up the author's work on the theory of random vibration and its application since 1959." The book consists of 8 full-fledged chapters containing random processes, random vibration of linear and nonlinear systems, reliability and longevity under random vibrations and vibration measurements of structures.

Chapter 1 introduces loadings as random functions of time. It includes random function of spatial coordinates in time, experimental data in stationary and nonstationary random loadings. Tensor analysis voices the employment of joint statistical functions. The author details the various types of random loadings acting upon the mechanical systems couched in mathematical terms and in experimental findings.

Chapter 2 expounds upon the methods uses in the theory of random vibrations. Linear systems include the method of Green's function (pulse response functions) and representation of spectral methods in the theory of random vibrations. The next section considers some methods of solving problems in linear system of a continuous nature. They are founded on Markov processes and Fokker-Planck-Kolmogorov equations. The chapter concludes with methods in statistical simulation. These numerical methods apply the Monte Carlo method with its representation in statistical modeling.

Chapter 3 continues with random vibrations of linear continuous systems applying the method of generalized coordinates plus approximate calculation of integrals. This leads to random vibration in viscoelastic systems, vibration of plates in a field of random processes and shells containing compressible fluid. We continue with approximate methods of analysis applied to shells, i.e., circular cylindrical shells with acoustically stiffened end walls. The chapter concludes with vibrations of an infinite viscoelastic plate in a field of stochastic forces and vibrations of viscoelastic shells. An excellent chapter that should be read carefully.

Chapter 4, a lengthy chapter, deals with the asymptotic method in the theory of random vibrations of continuous systems. The fundamentals of the asymptotic method are explained with applications to differential equations with constant coefficients. This, in turn, is applied to plates and shells. With this information under our belts, the theory of natural frequency of elastic systems is then considered. Boundary conditions play important roles and should not overshadow the bearings of the eigenfunctions. The chapter concludes with the method of integral estimates for the analysis of wide band random vibrations. It weighs the employment of approximate estimates for spectral densities and takes into account the joint correlation of generalized coordinates. Another excellent chapter!

Chater 5 expounds upon parametrically excited random vibrations which are a direct result of random vibrations and system parameters. The equation describes small oscillations of a pendulum with a moving suspension point. This continues with stability with respect to a set of moment functions and the important stochastic Lyapunov functions. This follows with three typical solutions used in the method of moment functions which were previously discussed in Chapter 2. Examples are given as to its use in stability. We forge ahead into the modification of the method of moment functions and formulas for higher order moments. The next topic is parametric resonances in stochastic systems with application to Mathieu-Hill equations and other stability boundary problems. The chapter concludes by comparing experimental data with analytical endeavors.

Chapter 6 refers to random vibration of nonlinear systems. This covers Duffing stochastic equations, methods of the theory of Markov's processes, the perturbation method, Fokker-Planck-Kolmogorov coverage and stochastic averaging. The construction of higher order approximations is touched upon with numerical analysis of "buckling" of panels, i.e., of a thin elastic shell. The chapter concludes with random vibrations of nonlinear continuous systems.

Chapter 7, another lengthy one, studies the reliability of mechanical systems subjected to induced random vibrations. The basic concepts of reliability theory open this chapter. This leads us to stochastic models of failure (Markov processes, Poisson models, cumulative models). Approximate estimates for reliability functions are stated with direct application to narrow band random plus extension of reliability theory to continuous systems. A natural consequence is the application of reliability theory to problems dealing with protection of mechanical systems subject to random vibrations and vibration isolation (linear and nonlinear). One then considers the models of fatigue damage accumulations and the Miner-Palmgren rule plus distribution and estimation of the longevity of induced random vibrations in mechanical components. The reviewer would have liked to see experimental evidence of both narrow and broad band induced random in components and systems and comparison with analytical results for random fatigue.

The concluding chapter lays out the planning of vibration measurements in structures under random vibration. Selection of sensors and the fundamentals of obtaining vibration measurements are stressed. The author further emphasizes that due consideration must be given to the installation of sensors for experimental findings. Errors must be avoided if possible, but methods in correcting these errors are detailed in the book.

In summary, this is an excellent text. The author spares "no horses" and encompasses an extremely large number of subjects in this book on random vibration. Some typographical errors are noted but they should not detract from the book. The reviewer heartily recommends this tome to those interested in random vibration. However, a great deal of study is required to comprehend this subject. Bravo to the author for this prodigious work!

Seismic Design of Frame-Panel Buildings and Their Structural Members, M. A. Mardzhanishvili, A. A. Balkema, Publishers, Rotterdam, The Netherlands, Distributed by International Publishers Service, Accord, MA, 1984, 121 pages, $22.00.

Translated from the Russian version, this book furnishes methods of designing frame-panel buidings. The analysis is founded upon a three-dimensional design model. It delves into the design employing the basic principles of statics and dynamics recounting the problems of earthquake proof buidings. The author studies the seismic design of multiframe buildings comprised of various types. The book conveys the idea of actual mechanical properties of buildings in the shape of "cross systems," "slabs," "boxes," and shell, under dynamic loads which are imposed upon them. The determination of seismic stresses relies upon the study of building oscillations considered to be cantilever systems. However, the extremely important spatial oscillations are ignored. Consequently, overlooking of these structures distant from the center of gravity tends to be overlooked. This tome carefully studies the seismic design problem of buildings based on three-dimensional systems. The book consists of 3 chapters and 20 tables. The latter consist of shear and effective rigidities of floor members, frequency of natural oscillations of frame construction, loads and forces in building members, bending and shear of a number of beams in various modes plus a number of others.

The initial chapter examines static design of frame-panel buildings. Beginning with main load bearing members of frame-panel buildings, it considers the effective rigidity factors of frames, diaphragms (braced with and without aperture), and floors. This continues with equilibrium equation for the cross section of a building plus the cross systems in a coordinate system. This follows with the equilibrium equation of a building with the frame system and built-up floor undergoing shear strain. Modifying the previous equation, the longitudinal forces in vertical members of buildings for horizontal displacements are calculated. Delving further, the author derives the general differential equations of equilibrium for a building with deformable and rigid floors. The boundary conditions for the equilibrium of a building is then slated. The concluding section uses modified equations based on previously derived equations for the effective height and rigidity of a building.

Chapter 2 focuses upon the important subject of the dynamics of frame-panel buildings. The general differential equations of oscillations of a building are derived. This leads to the determination of periods and waveforms of natural oscillations of point type and long buildings. The braced scheme for buildings with large number of diaphragms are covered which then converges to the frame brace scheme with two or more diaphragms.

Chapter 3 opens up the topic of seismic design of frame-panel buildings. Introducing the topic of seismic waves, this follows with the design of point type buildings subject to torsional seismic oscillations. The author points out that modern design of building rely upon computers. He employs his program entitled. "SIDR-12." The spatial design model of building considers a cross set of frames and vertical diaphragm-type frames. The chapter concludes with a thorough design example of a six-story building of frame construction with large dimensions in a plan. This relies upon (a) determination of the building mass and (b) rigidity characteristics of building members. Consequently, he determines the natural frequency of oscillations of the building and determination of the seismic wavelength forces.

The author does a good job in showing how a building can be designed using modern computational tools. Although primarily based on studies in Russian literature, we can garner a great deal of information by reading and studying this book.

Noise and Vibration Control in Buildings, R. S. Jones, McGraw Hill Book Co., New York, NY, 1984, 428 pages.

This is a different kind of book. The author details how one can control vibration and sound in buildings and structures. There is a definite need in detailing and explaining in a lucid fashion, specific instructions to the architect, engineer, and contractors regarding the correct application and installation of the proper equipment. Based upon the author's extensive knowledge gleaned from actual experience and installations, he attempts to close the existing gap between presenting the plans and specifications to the contractor and installation of the equipment. In closing this gap, written instructions show both completely and clearly how to locate the equipment and materials in a correct fashion. Thus, recommended acoustical goals could be accomplished. This book should help installers perform a job correctly and prevent misapplications. He further details how to correct incorrect installations and produce actual solution of good noise and vibration control equipment and materials in making the equipment function in a proper fashion. The book consists of 8 chapters and 9 appendices. The appendices consist of wire rope identification and conductors, rivets and threaded fasteners, State of California building standards for health facilities and schools plus seismic excerpts from the Uniform Building Code.

Chapter 1 introduces the key concepts and terms in vibration and noise control. Chapter 2 furnishes guidelines for architects, engineers, and contractors plus vibration and noise control treatments. This is applied to various types of isolators, equipment bases and mountings, acoustical treatment of ducts, and resilient supports of pipes. These are all accompanied by illustrative photos and drawings. Chapter 3 reports on mechanical systems, i.e., heating, ventilating, and air conditioning systems (HVAC). The various types of vibration isolation hangers are considered, housed springs and vibration isolators plus a vivid description accompanied by illustrations of mechanical isolators. This continues with ducts