



BOOK REVIEWS

ADVANCES IN NONLINEAR STOCHASTIC MECHANICS, PROCEEDINGS OF IUTAM SYMPOSIUM 1996, A. Naess and S. Krenk editors. Dordrecht, The Netherlands: Kluwer Academic Publishers, 528 pp. Price: Dfl.310.00; US\$199.00; US£137.00. ISBN 0792341937.

This book of 510 pages is made of 45 full papers presented to the IUTAM Symposium on *Advances in Nonlinear Stochastic Mechanics* held in Trondheim, Norway in July 1995. The contributions give a representative overview of recent advances in non-linear stochastic mechanics from theoretical aspects to practical engineering applications. A proportion of the papers reflect the active research (18 out of a total of 45 papers) in the specific area of stochastic stability (eight papers) and in the specific area of the theoretical methods for studying and solving stochastic discrete dynamical systems (ten papers). The other papers (27 out of the total of 45 papers) are mainly focused on the application of stochastic methods in mechanics and concern four specific areas: computational stochastic mechanics (seven papers), engineering applications of stochastic mechanics (11 papers), non-linear active control (two papers) and finally, stochastic dynamics of nonlinear structures (seven papers). The papers concerning the same specific area are not grouped together in the book; all the papers are presented in alphabetical order, related to the last name of the authors. This book is useful for researchers in the area of stochastic mechanics, but cannot be profitable for a non-expert reader.

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VIBRATIONS IN ROTATING MACHINERY, IMECHE CONFERENCE TRANSACTIONS 1996-6; Bury St. Edmunds, Suffolk, U.K.: Mechanical Engineering Publications Limited. 800 pp. Price £169.00 (overseas customers plus 10% for delivery).

This book is the edited Proceedings of the Sixth International Conference on Vibrations in Rotating Machinery, organized by the Institution of Mechanical Engineers (IMEchE) and held in Oxford, U.K., on 9–12 September 1996.

The book consists of 67 papers divided into 18 sections. The authors come from 20 different countries including European countries, Japan, U.S.A., Australia, India, etc. The papers are of high quality and most of them have been written by leading researchers or engineers working in the area of rotating machinery. They can be grouped into ten main topics which are listed and briefly described below.

1: Bladed systems (ten papers). Rotordynamic and bladed-disk models are combined in order to study the coupled behaviour of flexible disk–shaft assemblies. The behaviour of impellers and bladed assemblies interconnected with loose couplings is examined. Impact response and friction damper optimisation are considered. The interaction between impeller blades and guide vanes, as well as the influence of aerodynamic damping on the behaviour of wind turbines are studied. A paper deals with the response of a saw blade with an initial non-symmetric stress distribution. Finally, risk assessment of turbine blades is investigated by using a probabilistic model.

2: Bearings, seals and squeeze film dampers (16 papers). Some fundamental aspect of the dynamic properties of journal bearings are examined. Simplified calculation methods are proposed. Stability of high speed floating brush journal bearings, two lobe journal

bearings with surface wear dent, variable impedance hydrodynamic bearings and tilting pad journal bearings are examined. Dynamic coefficients of labyrinth seals with different configurations are considered both numerically and experimentally. Test results and numerical simulations of active magnetic bearing rotor drop are proposed. The ability of squeeze film dampers to control vibration of rotors is demonstrated in four papers.

3: Condition monitoring and signal analysis (four papers). Four papers are related to fault detection in rolling bearings and examine masking effects in digital envelope analysis, fault detection by using directional spectra, vibrations due to raceway imperfection and simulation via neural networks. Other papers show that the analysis of measured signals allows identification of phenomena occurring within a turbomachine. A quasi-joint-time-frequency signal analysis, a technique of decomposition into spatial, temporal and directional components and a fuzzy pattern recognition algorithm are presented. A framework for assessing vibration severity in terms of the probability of damage is proposed.

4: Torsional vibrations (four papers). The influence of coupling terms in the response of geared rotor systems is studied. Torsional vibrations of elastic crankshafts, diesel installations and asymmetrical rotors are examined. Both non-linear and transient effects are considered. One paper describes a novel method for exciting torsional vibrations of rotating shaft systems.

5: Control (four papers). A controller that can achieve attenuation of both unbalance and base motion vibrational effects is presented. A study deals with optimum damping conditions for transient vibrations of a rotor-shaft system. An active control for increasing helicopter stability is studied.

6: Non-linear phenomena (four papers). Topics considered are: non-linear hysteresis loop for rotor bearing instability, high power two-pole induction motors, rotor operating in magnetic fields and elimination of subsynchronous vibrations.

7: Rub effects (four papers). Sudden unbalance inducing rotor/casing rub is studied. The effect of support asymmetry, coupled structural thermal problems, spiral vibrations and blade loss are considered.

8: Balancing (four papers). Time domain theory and an influence coefficient technique using multiple trial mass sets are illustrated. A method is presented for evaluating the state of unbalance in flexible rotors. Finally, the use of magnetic bearings for unbalance resonance vibration control is examined.

9: Modal testing (four papers). Identification procedures, aimed at obtaining unbalance, deformed shapes, support dynamic coefficients associated with shaft lines in operating conditions are presented.

10: Dynamic analysis (four papers). This last section deals with, rotordynamic evaluation using the resonance energy factor of a high speed gear compressor, influence of fluid on the dynamic behaviour of a turbine runner, stress in rotating and laterally vibrating rotors and, finally, measurements on a rotor contacting its housing.

In conclusion, the book offers a useful and coherent collection of papers. Two main interesting characteristics emerge from the assembly. First, while dealing with fundamental problems, the studies presented are generally oriented toward practical industry-related applications. Second, a significant number of papers present experimental results, obtained from test rigs or field measurements. Numerical models are not only presented and illustrated but often correlated with experimental results. Consequently, this book is highly recommended to researchers and engineers working in the field of vibration in rotating machinery.

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