Kabayashi *(Univ of Delaware DE)*. World Sci Publ, River Edge NJ. 1999. 400 pp. ISBN 981-02-2163-0. $113.00.

This book covers theoretical and practical aspects in the design and construction of maritime structures against waves.

The topics covered include description of sea surface motion; harbor problem; wave-structure interaction; design and stability analysis of mound breakwaters and vertical walls; composite and other special breakwaters; structure on piles; breakwaters for very short waves; risk analysis; construction and maintenance of maritime works; site investigations and data acquisition.

9N10. Proceedings of DETC99, Vol 7, Part A, 17th Biennial Conference on Mechanical Vibration and Noise. From DETC99, Sept 1999, Las Vegas. - ASME, New York. 1999. 1648 pp. ISBN 0-7918-1977-9. ASME Book No I0443A.

This proceedings volume is divided into two parts which include 355 full-length peer-reviewed technical papers. This part covers the following topics: acoustic scattering; active and hybrid structural vibration control; actuators in smart structures design; analytical applications of random dynamical systems; bifurcations and nonlinear analysis; control of nonlinear systems; damage detection; dynamics and control; dynamics and vibration of geared; dynamics and vibrations of structures with mechanical joints; dynamics of systems with resonance; experimental and case studies; flexible multibody; friction induced vibration; impact and intermittent motion; manufacturing applications; modal analysis of continuous systems; active vibration control and actuation using smart; aircraft dynamics and control; applications of genetic algorithms to vibration and design; beams and impacting systems; control of generalized Hamiltonian systems; control of smart structures and systems; dynamical systems methods for data analysis, modeling, and prediction; dynamics and control problems in time-varying systems; dynamics and vibration of machine system; dynamics of cutting and drilling; engineering systems; fault detection/diagnosis in rotating machinery; friction and impact induced vibrations; fundamentals of discontinuous systems; magnetic bearings; mechanism and robotics; and modeling and nonlinear phenomena.

9N11. Proceedings of DETC99, Vol 7, Part B, Mechanical Vibration and Noise Conference. From DETC99, Sept 1999, Las Vegas. - ASME, New York. 1999. 1618 pp. ISBN 0-7918-1977-9. ASME Book No I0443B. $500.00. (ASME members $250.00).

This proceedings volume is divided into two parts which include 355 full-length peer-reviewed technical papers. This part covers the following topics: multibody algorithms and numerical methods; multibody vehicle dynamics; nonlinear modes and localization; nonlinear vibration of continuous systems; rotor dynamic modeling; space dynamics and control; statistical energy analysis for design; system analysis; time-frequency and wavelet analysis; vibration damping: modeling and applications; vibration of complex systems; vibration of rotating shafts and disks; multibody simulations and applications; new concepts of asymptotic approaches in nonlinear dynamics; nonlinear response of hysteretic oscillators; nonsmooth dynamics; rotor dynamics; stability problems in time-varying systems; structures and applications; tensegrity: A new structural control paradigm; torsional and balancing; vibration of beam systems; and vibration of plates and shells.

9N12. Theoretical and Computational Acoustics '97. - Edited by Y-C Teng *(Columbia Univ, New York NY)*, E-C Shang *(Univ of Colorado)*, Y-H Pao *(Natl Taiwan Univ, ROC)*, MH Schultz *(Yale Univ)*, AD Pierce *(Boston Univ, Boston MA)*. World Sci Publ, River Edge NJ. 1999. 600 pp. ISBN 981-02-3463-5. $92.00.

This proceedings volume is dedicated to Dr Ding Lee for his untiring efforts in promoting the advancement of theoretical and computational acoustics.

The volume provides a forum where active researchers discuss the state-of-the-art developments and results in theoretical and computational acoustics, covering aero-, seismo-, and ocean acoustics and related topics. It covers multidimensional wave propagation modeling, methods of computational acoustics, wave propagation in rocks, fluid-solid interfaces, nonlinear acoustics, neural networks, real applications, and experimental results.

Autoparametric Resonance in Mechanical Systems. - A Tondl *(Tech Univ of Vienna, Austria)*, T Ruijgork, F Verhulst *(Dept of Math, Univ of Utrecht, Netherlands)*, R Nabergoj *(Dept of Naval Architec, Univ of Trieste, Italy)*. Cambridge UP, Cambridge, UK. 2000. 196 pp. ISBN 0-521-65079-8. $59.95. (Under review)

Chaotic Mechanics in Systems with Impacts and Friction. Series on Nonlinear Science, Series A, Vol 36. - B Blazejczyk-Okolewska, K Czolczynski, T Kapitaniak, J Wojewoda *(Tech Univ, Lodz, Poland)*. World Sci Publ, Singapore. 1999. 173 pp. ISBN 981-02-3716-2. $51.00. (Under review)

Dynamics and Control of Machines. Foundations of Engineering Mechanics. - VK Astashev *(Inst of Machine Stud, Moscow, Russia)*, VI Babitsky *(Dept of Mech Eng, Loughborough Univ, Loughborough, Leicestershire, LE11 3TU, UK)*, MZ Kolovsky *(State Tech Univ of St Petersburg, Kondratievskuy 56-24, St Petersburg, 195197, Russia)*. Springer-Verlag, Berlin. 2000. 233 pp. ISBN 3-540-63722-2. $92.00. (Under review)

Dynamics: An Introduction for Civil and Structural Engineers. ICE Design and Practice Guides. - JR Maguire *(Lloyd's Register, UK)* and TA Wyatt *(Imperial College, UK)*. Inst Civil Eng, London, UK. 1999. 80 pp. Softcover. ISBN 0-7277-2522-X. (Under review)

Fundamentals of Physical Acoustics. - DT Blackstock *(Dept of Mech Eng, Univ of Texas, Austin TX)*. Wiley, New York. 2000. 541 pp. ISBN 0-471-31979-1. $90.00. (Under review)

Impact Mechanics. - WJ Stronge *(Dept of Eng, Univ Cambridge, UK)*. Cambridge UP, Cambridge, UK. 2000. 280 pp. ISBN 0-521-63286-2. $69.95. (Under review)

Mechanical Processes with Repeated Attenuated Impacts. - RF Nagaev *(St Petersburg Mining Inst, Russia)*. World Sci Publ, Singapore. 1999. 237 pp. ISBN 981-02-3504-6. $48.00. (Under review)

Mechanics and Dynamical Systems with Mathematica®. - N Bellomo, L Preziosi *(Dipartmento di Matematica, Politecnico di Torino, Corso Duca degli Abruzzi 24, Torino, 10129, Italy)*, A Romano *(Dipartmento di Matematica, Univ di Napoli, Complesso Monte S Angelo, Napoli, 80138, Italy)*. Birkhauser Boston, MA. 2000. 417 pp. ISBN 0-8176-4007-X. $69.95. (Under review)

Nonholonomic Motion of Rigid Mechanical Systems from a DAE Viewpoint. - PJ Rabier and WC Rheinboldt *(Univ of Pittsburgh, Pittsburgh PA)*. SIAM, Philadelphia. 2000. 140 pp. Softcover. ISBN 0-89871-446-X. $36.00. (Under review)

Numerical Methods for Bifurcations of Dynamical Equilibria. - WJF Govaerts *(Univ of Gent, Gent, Belgium)*. SIAM, Philadelphia. 2000. 362 pp. Softcover. ISBN 0-89871-442-7. $61.00. (Under review)

Stability of Gyroscopic Systems. Series on Stability, Vibration and Control of Systems, Series A, Vol 2. - Edited by A Guran *(Elec Eng-Syst Dept, Univ of S California, 3740 McClintock Ave, EEB 308, Los Angeles CA 90089-2563)*, A Bajaj *(Sch of Mech Eng, Purdue)*, Y Ishida *(Dept of Electron-Mech Eng, Nagoya Univ, Furo-cho, Chikusa-ku, Nagoya, 464-01, Japan)*, N Perkins *(Dept of Mech Eng and Appl Mech, Univ of Michigan, Ann Arbor MI 48109-2125)*, G D'Eleuterio *(Inst for Aerospace Stud, Univ of Toronto, Downsview ON, M3H 5T6, Canada)*, C Pierre *(Dept of Mech Eng, Univ of Michigan, Ann Arbor MI 48109-2125)*. World Sci Publ, Singapore. 1999. 412 pp. ISBN 981-02-2630-6. $94.00. (Under review)

Vibration Analysis of Plates by the Superposition Method. Series on Stability, Vibration, and Control of Systems, Vol 3. - DJ Gorman *(Dept of Mech Eng, Univ of Ottawa, Canada)*. World Sci Publ, Singapore. 1999. 361 pp. ISBN 981-02-3681-6. $90.00. (Under review)

Water Wave Scattering by Barriers. - BN Mandal *(Phys and Appl Math Unit, Indian Stat Inst, Calcutta, India)* and A Chakrabarti *(Indian Inst of Sci, Bangalore, India)*. WIT Press, Southampton, UK. Distributed in USA by Comput Mech Publ, Billerica MA. 2000. 390 pp. ISBN 1-85312-623-3. $197.00. (Under review)

III. AUTOMATIC CONTROL

9R13. Stability and Stabilization of Infinite Dimensional Systems with Applications. - Zheng-Hua Luo *(Dept of Mech Eng, Nagaoka Univ of Tech, Kamitomioka-cho 1603-1, Nagaoka, Niigato, 940-2188, Japan)*, Bao-Zhu Guo *(Dept of Appl Math, Beijing IT, Beijing, 100081, China)*, O Morgul *(Dept of Elec and Electron Eng, Bilkent Univ, Bilkent, Ankara, 06533, Turkey)*. Springer-Verlag, NY. 1999. 403 pp. ISBN 1-85233-124-0. $129.00.

Reviewed by M Mansour (Autom Control Lab, ETH, Zurich, ZH 8092, Switzerland).

This book deals with the stability and stabilization of systems described by linear differential equations with several control systems applications. The introduction begins with linear finite dimensional systems whose transmission matrix $T(t) = \exp.(At)$ is a strongly continuous semigroup on R^n. It is shown that several infinite dimensional systems like the heat equation, population equation, string equation, and Euler-Bernoulli equation of the vibration of a rotating beam with free tip end can be formulated as an abstract Cauchy problem with A as the system operator unbounded in Hilbert space H and T(t) a bounded operator which is a C_0-semigroup generated by A. Stability is sometimes determined by the spectrum of A and sometimes not. In the latter case, one uses the spectrum-determined growth condition. It is shown that the well-posedness and stability of abstract Cauchy problems are completely characterized by the semigroups generated by their system operators. Therefore, the study of semigroups is fundamental for the understanding. This overview of the book in the first chapter is very helpful.

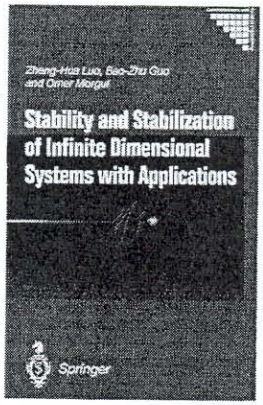
Chapter 2 deals with semigroups of linear operators. The material in this chapter is mostly standard and can be found in textbooks on semigroup theory or functional analysis. The theory of integrated

semigroups is treated in detail and builds an essential topic to deal with some types of partial differential equations. Here conditions for an operator to generate an n-times integrated semigroup are derived.

Chapter 3 deals with the stability of C_0-semigroups. It is shown that the asymptotic stability of C_0-semigroups T(t) generated by A is completely characterized by the spectrum of A whereas the exponential stability of T(t) may not be completely determined by the spectrum of A. In this case if T(t) satisfies the spectrum-determined growth condition, then T(t) is exponentially stable as long as the spectrum of A lies on the open left half side of the complex plane. The class of C_0-semigroups satisfying the spectrum-determined growth condition is determined. A C_0-semigroup which is continuous in the uniform operator topology in Banach space (like compact semigroups, differentiable semigroups and analytic semigroups) satisfy the above condition. Exponential stability can be checked using time domain criteria, frequency domain criteria, and spectral analysis where the spectrum-determined growth condition holds, and an energy multiplier method which is a combination of Lyapunov and time domain methods. The question of why the exponential stability of a C_0-semigroup may not be determined by the spectrum of its generator is solved by introducing the concept of essential growth rate of A. Also, a simpler proof of the frequency domain criterion based on the Fourier analysis of Hilbert space valued functions is given.

Chapters 4, 5, and 6 consider different practical systems represented by partial differential equations where the above theory is applied. In Chapter 4, Euler-Bernoulli beam equations, which model the dynamics of vibration of large space structures, and flexible robot arms with and without damping and with strain or shear force feedback control, are considered. Well-posedness and stability is proved using the concept of A-dependent operators which are special unbounded operators for semigroup generation. This worked well for strain feedback of a rotating beam and shear force feedback of a translating beam. For shear force feedback of a rotating beam, the theory of integrated semigroups is used to prove exponential stability. Also in this chapter, the stability analysis for a sensor output feedback of a hybrid system composed of PDE and ODE based on the compact perturbation theory is performed. The energy function is used to investigate stability of a nonlinear system obtained through time-dependent gain using a quadratic gain adaptive law of the strain feedback control of the Euler-Bernoulli equation. It is confirmed that feedback using high order derivative information is more powerful for the stabilization of infinite dimensional systems.

Chapter 5 deals with dynamic boundary control of vibrating systems based on passivity. A general framework for system passivity is obtained. The Wave equation, the Euler-Bernoulli beam equations, and the Timoshenko beam equation with adequate system outputs and boundary control inputs are considered. To achieve closed-loop asymptotic stability, a positive real controller is designed as in the case of finite dimensional systems. The main tool used to prove exponential stability of various feedback loops is the energy multiplier method. Also stability robustness w.r.t. small time delay in the dynamic feedback is considered.



Chapter 6 considers general hyperbolic systems with serially connected vibrating strings with point stabilizers, as well as a vibrating cable with a tip mass, and thermoelastic equations with certain boundary stabilizers as examples. Here the spectrum-determined growth condition is proved, and hence exponential stability with the spectrum analysis method is determined. It is also shown that the spectrum alone cannot determine the growth rate for a two-dimensional hyperbolic system even with low order perturbations.

There are topics which are not dealt with in this book, like systems with time delay which are also infinite dimensional systems. Infinite dimensional systems with time varying parameters and nonlinear systems are other topics. In the area of robust stability of infinite dimensional systems of the above topics this reviewer mentions here the book by Gil: *Stability of Finite and Infinite Dimensional Systems* (Kluwer Academic Publishers, 1998).

In summary, *Stability and Stabilization of Infinite Dimensional Systems with Applications* is one of the few books dealing with stability and stabilization of control systems represented by partial differential equations. It deals with the problems in a systematic way and is recommended for students in applied mathematics and in control engineering after a course in functional analysis or a mathematical background as given in the book of Curtain and Zwart: *An Introduction to Infinite-Dimensional Linear System Theory* (Springer-Verlag, 1995).

Finally this reviewer commends the authors for this well-written book.

9N14. Proceedings of DETC99, Vol 6, International Symposium on Motion and Vibration Control. From DETC99, Sept 1999, Las Vegas. - ASME, New York. 1999. 328 pp. ISBN 0-7918-1976-0. ASME Book No I00442. $130.00. (ASME members $65.00).

This proceedings offers 42 full-length peer-reviewed technical papers on the following topics: active vibration control and noise control; actuators and sensors; identification and modeling; magnetic bearings; modeling and control; motion control; robot arm and mobile robots; and smart machines and controls.

Extending H^∞ Control to Nonlinear Systems: Control of Nonlinear Systems to Achieve Performance Objectives. Advances in Design and Control Series, Vol 1. - JW Helton *(UCSD)* and MR James *(Dept of Eng, Australian Natl Univ, Canberra, Australia)*. SIAM, Philadelphia. 1999. 333 pp. Softcover. ISBN 0-89871-440-0. $59.50. (Under review)

Fundamentals of Modeling and Analyzing Engineering Systems. - PD Cha, JJ Rosenberg, CL Dym *(Dept of Eng, Harvey Mudd Col, Claremont CA)*. Cambridge UP, Cambridge, UK. 2000. 466 pp. Softcover. ISBN 0-521-59463-4. $44.95. (Under review)

Sensitivity of Automatic Control Systems. - E Rosenwasser and R Yusupov. CRC Press, Boca Raton FL. 2000. 436 pp. ISBN 0-8493-2293-6. $89.95. (Under review)

IV. MECHANICS OF SOLIDS

9R15. Analysis of Cracks in Solids. International Series on Advances in Fracture Mechanics. - AM Khludnev and VA Kovtunenko *(Lavrentyev Inst of Hydrodynamics, Russian Acad of Sci, Russia)*. WIT Press, Southampton, UK. 2000. 386 pp. ISBN 1-85312-625-X. $195.00.

Reviewed by JP Dempsey (Dept of Civil and Env Eng, Clarkson Univ, PO Box 5710, Potsdam NY 13699-5710).

This book treats the analysis of cracks in plates and shells. Relying heavily on the mathematical tools of functional analysis, the issues of existence, regularity, and convergence are discussed extensively for a range of elastic, thermoelastic, and elastoplastic problems. Unilateral contact conditions are imposed on the crack faces.

Chapter 1 first reviews linear elasticity, Rabotnov-type creep laws, elastoplasticity based on Hencky's law, and covers plate and shell theory for these classes of behavior. Conditions for unilateral contact and variational formulations follow. Chapter 2 focuses on cracks in plates and shells. Various problems are considered (the following section headings are repeated verbatim): 1) Viscoelastic contact problem for a plate; 2) A plate under creep conditions; 3) A plate with vertical and horizontal displacements; 4) Contact problem for plate having a crack; 5) Cracks of minimal opening in plates; 6) Solving methods for plates with cracks; 7) Contact problem for a shell with a crack; 8) Signorini problem for cracks in shells; 9)