

control system that permits the compressor to surge. Further emphasis is given to the design of the system using data that is necessarily "fuzzy", and the need for judgement and "belt and suspenders" conservatism. This volume is intended to be both theoretical and practical so that it shows the basic concepts of compressor control theory and the application of these concepts to daily practice.

Contents: Introduction and overview; Centrifugal pumps; Thermodynamics of compression; Prime movers and ancillary systems; Capacity control; Surge control; Control system interaction; Coordinated compressor control; Multiple compressor systems; Optimization of compressor operation; Appendix A: Nomenclature; Appendix B: Suggested readings and study materials; and Appendix C: Solutions to all exercises.

**7N69. Design, modelling and control of pumps.** 1st Bath international fluid power workshop, Bath, UK, Sep 1988. - Edited by C R Burrows and N D Vaughan (UK). Wiley, New York. 1989. 173 pp. ISBN 0-471-92189-0. \$85.00.

The broad theme for the workshop was pumps, with emphasis on the pumping of water and of fluids with high water content. Papers dealt with recent design development, modern materials, condition monitoring, and results of recent research relevant to water pump design.

**7N70. International conference on applications of lasers and electro-optics, Orlando FL, Oct 1989.** LIA vols 68 & 69. - Laser Inst Am, Orlando FL. 1989. Paper. ISBN 0-912035-39-0.

Optical methods in flow and particle diagnostics (vol 68) includes sessions on: Laser Doppler velocimetry; Imaging velocimetry; and Fluid measurements and volumetric imaging. Laser material processing (vol 69) includes sessions on: Emerging technology and trends in laser materials processing applications; Role of automation in laser materials processing; Benefits of laser materials processing for improved manufacturing procedures; and Industrial laser materials processing applications.

**7N71. Low Reynolds number aerodynamics.** Proceedings of the conference, Notre Dame IN, Jun 1989. - Edited by T J Mueller. Springer, New York. 1989. 446 pp. Paper. ISBN 0-387-51884-3. \$60.50.

Papers (partial): Prediction of aerodynamic performance of airfoils in low Reynolds number flows; Fast method for computation of airfoil characteristics; Instability of two-dimensional laminar separation; Bursting in separating flow and in transition; Performance measurements of an airfoil at low Reynolds numbers; Computationally efficient modeling of laminar separation bubbles; Wind tunnel investigations of wings with serrated sharp trailing edges; Computation of viscous unsteady compressible flow about profiles; Captive carrying testing of remotely piloted vehicles; and Vortex lock-on and flow control in bluff body near-wakes.

**7N72. Modern compressible flow: With historical perspective, 2nd ed.** - John D Anderson Jr (Dept of Aerospace Eng, Univ of Maryland, College Park MD). McGraw-Hill, New York. 1990. 610 pp. ISBN 0-07-001673-9.

This book is intended primarily for the senior undergraduate or first-year graduate course in compressible flow taught by aeronautical and mechanical engineering departments.

This very successful text which presents the fundamentals of classical compressible flow also emphasizes modern compressible flow dynamics and high temperature flows. The second edition continues with the success of the first by maintaining the same engaging writing style, and philosophical and historical perspectives on the topics. Significant updating is evident, including new information on 3-D and transonic flows. Major changes in the current edition include: a new chapter on the physical and computational aspects of 3-D flows, which have recently become valid and challenging problems; new chapters on transonic flow and hypersonic flow; and additional worked examples and new homework problems. A solution manual (ISBN 0-07-001674-7) is available to accompany this textbook.

Contents: Compressible flow - some history and introductory thoughts; Integral forms of the conservation equations for inviscid flows; One-dimensional flow; Oblique shock and expansion waves; Quasi-one-dimensional flow; Differential conservation equations for inviscid flows; Unsteady wave motion; General conservation equations revisited: Velocity potential equation; Linearized flow; Conical flow; Numerical techniques for steady supersonic flow; Time-dependent technique: Application to supersonic blunt bodies and nozzles; Three-dimensional flow; Transonic flow; Hypersonic flow; Properties of high temperature gases; and High temperature flows: Basic examples.

**7N73. Naval hydrodynamics.** 17th Symposium, the Hague, Netherlands, Aug-Sep 1988. - Natl Res Council, Washington DC. 1989. 636 pp.

Forty papers were presented on five topical areas covered by the symposium including: Free surface effects; Boundary layers and viscous flows; Two-phase flow; and Propeller-appendage-hull interactions. These topical areas were chosen for this particular meeting because of the recent advances that have been made in these areas. The perspective of the papers varied from significant timely reviews, such as the paper on computational and experimental viscous ship hydrodynamics, to experimental discoveries of new phenomena such as the nonlinear oscillatory bow waves and the observed relation between cavitation and coherent flow structures on hydrofoils, and to the new use of spectral element methods to compute nonlinear ship wave patterns. A notable number of papers were related to nonlinear dynamics including predictions of chaos in ship motions and to ship hydrodynamics relative to remote sensing.

**7N74. Plastics blow molding today & tomorrow: Pushing the process limits.** 4th Annual high performance blow molding technical conference, Cherry Hill NJ, Oct 1989. - Soc Plastics Eng, Brookfield Center CT. 1989. Paper.

Papers include: Barrier packaging properties of fluorinated HDPE toward flavor molecules; Blow molding of melt processable rubber; Blow molding with engineering plastics; Blow molding economics of automatic parts finishing; Parison striping of industrial blow molded parts; Use of flow analysis in the injection blow molding process; Statistical process control in blow molding; Recycled PET bottle market; Plastic drums recycling; and Plastic lumber from recycled milk jugs.

## VI. THERMAL SCIENCES

**7R75. New heat transfer, 2nd ed.** - Eugene F Adiutori. Ventuno, West Chester OH. 1989. 434 pp. \$29.95.

Reviewed by John E Ahern (738 Parkbrook Lane, Glendora CA 91740).

This book raises some very interesting questions concerning the techniques used by engineers in their analysis of heat transfer, electricity, fluid flow, and mechanical stress. The solution to greater simplicity and accuracy proposed in this book, however, will be controversial and not readily acceptable by engineers—at least at the present time. The book states that the engineering sciences should be based on using only fundamental parameters such as temperature, heat flux, flow rate, volts, and stress, and not use the contrived parameters such as electrical resistance, heat transfer coefficient, friction factor, or elastic modulus. This approach eliminates Newton's, Fourier's, Young's and Ohm's laws as well as all of the well-known dimensionless parameters such as Nusselts, Reynolds, Stanton, and Prandtl numbers. Experimental data correlations as presently developed and used would not be accepted under this proposed method of engineering analysis. In place of these laws and dimensionless parameters the book proposes only the use of data that are measured values of fundamental parameters.

To support this engineering analysis method the author provides examples that are discussed to various degrees of detail. Many of these cases which use the new method conclude by asserting that the data are proprietary or the cases are in the patent process and that the details cannot be disclosed. The discussion on correlation of test data points out the fact that linear plots can show data behavior better than log-log plots. But then, the book states that conclusions reached from plotting data on log-log paper should be ignored. This latter proposal, and the book's rejection of dimensionless parameters (mentioned above), are refuted by the highly successful and useful correlations of complex heat exchanger configurations with various fluids developed by several authors including Zukauskas et al who published in the Russian literature (Reviewed in *AMR* 39(10) 1986, 40(12) 1987, 42(1) 1989, and 43(2) 1990). These correlations are applicable with engineering accuracy for heat exchanger design and analysis over a wide range of conditions.

Since the book does raise the issue of developing simpler and better techniques

for engineering data analysis and correlation, it should be of interest to engineering professors if only to make them aware of what their students might be exposed to. Research engineers may be interested in the ideas proposed in this book. The rapid development of computer data mass storage should allow a trend toward greater use of basic test data and more data reliability as proposed in this book, but the use of dimensionless correlations in engineering design and performance analysis will be required for a long time to maintain the database developed in the engineering sciences.

**7R76. Thermofluid-dynamics of optimized rocket propulsions.** Extended Lewis code fundamentals. - Dieter Straub (*Inst of Thermodyn, Univ Armed Forces Munich, Werner Heisenberg Weg 39, 8014 Neubiberg, FRG*). Birkhauser, Boston. 1989. 265 pp. ISBN 0-8176-2314-0. \$95.00.

Reviewed by Lewis A Glenn (*Physics Dept (H Division), LLNL - UC, P.O. Box 808, Livermore CA 94550*).

As an old hand in the rocket propulsion business the reviewer eagerly looked forward to reading this monograph, which was advertised as a new treatment of "the process of simultaneous chemical reactions in flows occurring in ... rocket engines." Unfortunately, Straub's book is a major disappointment. It is, in fact, a disorganized, poorly edited and technically inaccurate description of a fairly well understood subject.

The book was translated from the original German and is apparently intended as a new standard for jet or rocket engine design, but is certainly not a text on the subject in the tradition of Barrere *et al* (1960) or Sutton (5th ed, 1986). In the main, what emerges is a critique of a NASA report describing a computer program for calculating thermochemically coupled fluid flow in rocket engines. The book is divided into two main parts entitled Optimal comparative process for rocket engines, and Thermofluidynamics of rocket propulsion. The first part is subdivided into four sections which center on something called an Ideal Comparative Process, the definition of which requires no less than 10 pages of text (after which one is still uncertain as to the meaning of this term). The last section in part I supposedly deals with design criteria for rocket engines however, after careful search, the reviewer was unable to find anything sensible pertaining to engine design. A one page summary of part I was nothing more than gibberish!

Part II is similarly divided into four main sections and a summary. The first section is entitled Problems with the

NASA-methods and is basically a rambling review of a 1976 NASA report which the author feels has many defects. The next two sections deal with something called the Alternative Theory, defined (p 121) as a phenomenological continuum theory of real compressible fluids, or a mathematical theory of thermofluidynamics, and the Munich Method. The latter is the "the terminus technicus for the mathematical representation of a thermodynamically-based calculation procedure which can only be used iteratively with respect to concrete problems." Both sections are full of interesting tidbits, eg, on page 129 in bold type we are informed that the "Navier-Stokes equations of motion can be substantiated only for incompressible model fluids; for real compressible materials, one can only define it!"

*Thermofluid-Dynamics of Optimized Rocket Propulsions* concludes with an 8 page bibliography, symbol list, 2 appendices, a list of notes, and 2 indices. On completing the reading, the reviewer's main reaction was one of amazement that a reputable publisher would produce such a volume. Adding insult to injury is the \$95.00 price for only 265 pages of text. The recommendation is that this monograph be allowed to remain at Birkhauser; regrettably, it is suitable for little else.

**7N77. Aircraft fire safety.** Propulsion and energetics panel 73rd symposium, Sintra, Portugal, May 1989. - AGARD-NATO, Neuilly-sur-Seine, France. 1989. 50 pp. Paper. ISBN 92-835-0529-8.

Although the safety standards in aviation are already very high, the risk of accidents which involve fires cannot be completely excluded. It is therefore necessary to strive continuously for the enhancement of fires safety in aviation. One of the main aspects in this problem area is to review fire-related accidents and to learn from them in order to improve safety regulations and to update relevant research programs. Additional information is taken from studies of aircraft internal and external fires, both full-scale experimental and numerical modeling of cabin fires where the latter is receiving growing attention. The practical conversion of such knowledge into fire-hardened designs of aircraft, both military and civil, is another aspect of the problem area where advanced materials and improved structural designs represent the main lines to be pursued toward improved fire safety. Finally, growing interest is placed on the increase of survival times of passengers by means of improved passenger protective methods, concerning not only civil but also military transport aircraft.

Sessions: Review of fire-related aircraft accidents; Fire safety standards and research programs; Aircraft internal fires; Aircraft external fires; Fire safety of military weapon systems; Fire hardening by advanced materials and structural design; Passenger behavior in emergency situations; and Passenger protective equipment.

**7N78. Ceramic substrates and packages for electronic applications.** International symposium on ceramic substrates, Denver CO, Oct 1987. - Edited by Man F Yan et al. Am Ceramic Soc, Columbus OH. 1989. 608 pp. ISBN 0-916094-35-0.

Following the overview paper the book is divided into 6 sections: Covalent ceramics: Low temperature firing compositions; Low dielectric constant compositions; Microwave and electronic applications; and Processing science and technology. Some of the specific topics discussed include: Aluminum nitride fibers; Thermal diffusivity measurements; Crystallizable dielectrics; Thermal mechanical and dielectric properties of mullite-cordierite composites; Low permittivity silica; Photosensitive thick-film processing; Factors affecting lead bend strength; and Hermetic sealing of Kovar to borosilicate glass.

**7N79. Cogeneration systems.** (Теплофикационная система). (Russian). - L S Khrilev (*USSR*). Energoatomoizdat, Moscow. 1988. 272 pp.

This book describes the issues related to complex optimization of cogeneration systems at various hierarchical levels. The computational techniques are given as well as the specifics of preparing and considering ill-defined input data. Numerous computational examples are provided. The influence of a changing scale of cogeneration usage on the structure of unified electro power systems is analyzed for the example of general USSR power systems. Finally, the basic directions of advances in cogeneration are considered. There are 64 references (E Rivin).

Condensed contents: Methods of optimization of directions and scale of cogeneration implementation including: hierarchical levels and basic optimization problems, role of cogeneration in the Soviet energy systems, scaling and prioritization of development of new cogeneration units in a large region, and simulation and optimization of cogeneration systems; Economic justification of optimal directions, and levels of development of cogenerating stations using fossil and nuclear fuel; and Basic directions of future development including gas-turbine stations, steam stations, and high temperature nuclear reactors.

**7N80. Cold chains in economic perspective.** Proceedings, international institute of refrigeration, Wageningen, Netherlands, May 1988. - Int Inst Refrigeration, Paris, France. 1988. 409 pp. Paper. ISBN 2-903633-43-6.

The purpose of the meeting was to discuss various aspects of the economics of the cold chain. Forty-five papers were presented on the following themes: Development trends and the main cold chains (frozen foods, fruit and vegetables, meat, dairy products); Optimization of refrigerating processes and equipment; System modeling; Refrigerated transport; Operation and control of equipment; and Products and processes.

**7N81. Extremal methods of solving non-correct problems.** (Экстремальные методы решения некорректных задач). (Russian). - O M Alifanov, E A Artiukhin, S V Rumiantsev (*USSR*). Nauka, Moscow. 1988. 288 pp.

The book explores one direction in the area of solving ill-formulated problems-iteration regularization techniques. The issues of constructing and proving regularizing gradient algorithms are addressed. The regularization is