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in Eq. (5:26) on p. 101, and introduced new ones as in three equations on page 12 and line 7 from the bottom of page 18. New material is inserted in the first two chapters, including a short section on heat addition to flow in a duct. Little or no new material has been added to Chapters 3, 4, and 5 which are devoted to two-dimensional flow. Chapter 6 on supersonic wind tunnels has been considerably enlarged and improved. Chapter 7 on three-dimensional flow has been retained without change and Chapter 8 is the new one which considers the static performance of an example supersonic fighter plane.

This reviewer believes that the new edition does not show any essential improvement over the shortcomings of the first edition, which are its lack of depth, as well as the superficial treatment of thermodynamics and its total neglect of subsonic and transonic flow. Other texts are available which give the student a deeper insight into the understanding of compressible fluid flow. It is true, however, that this one is on or about the level of understanding of the average engineering undergraduate, who does appreciate the detailed working out of most derivations, which is a feature of this book, even though their rigor is sometimes questionable.

Engineering Systems Analysis. By Robert L. Sutherland. 223 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass., 1958. \$7.50. *Reviewed by Peter L. Balise, University of Washington.*

Technology is becoming so complex that engineering can no longer be taught by a series of courses giving practical methods for solving various problems. Although some practical applications are necessary as examples, the variety of engineering work is so great that all the types of problems likely to be encountered cannot be covered in a few years of study. Recognizing this, engineering educators are stressing more and more the importance of a good understanding of fundamental principles. This emphasis is also appropriate in view of the progress of engineering from an art to a science; many subjects formerly treated by empirical formulae have now yielded to mathematical analysis. Another factor of great significance in engineering education is the growing interrelationship between the several divisions, such as electrical and mechanical engineering. While we sometimes seem to be developing more specialties, such as nuclear engineering and instrumentation engineering, actually these specialties require men whose minds can readily cross division lines.

Professor Sutherland's book has the objective of helping to develop students' minds in this way; it deals largely with analyzing analogous mechanical and electrical systems at the advanced undergraduate level. The second-order linear differential equation, which probably represents the best analogies with which to introduce the subject, is treated in detail for mechanical, electrical, and acoustical systems. The latter, usu-

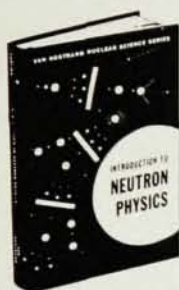
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ally discussed only in physics texts, is particularly interesting, especially as the author applies the results to the design of a loudspeaker enclosure. Another uncommon concept (to the mechanical engineer) that is well explained is the use of Q as a measure of sharpness of a system's frequency response peak.

Besides a thorough treatment of converting from mechanical systems and units to electrical systems and units, the book offers excellent introductions to dimensional analysis, feedback and control, and analog and digital computers. The author has made a judicious choice of which details to omit in these areas, so that the principles are clearly but concisely covered, with sufficient examples to whet the reader's interest in some of the references. There are also many challenging problems.

The book could probably be used for few courses in toto, but as mentioned earlier there is a trend towards such courses. It is the reviewer's opinion that engineers and scientists should be acquainted with these subjects, particularly analogies, feedback, and computers. Although Professor Sutherland's explanations are sufficiently clear that the book is quite readable, a good teacher will find much to add. For example, the analogous response of mechanical and electrical systems is presented, and resonance illustrated, but the opportunity is missed to point out why resonance usually refers to maximum velocity rather than to maximum displacement, as would be expected for a mechanical system. However, the thinking reader, noting that velocity is analogous to current, while displacement is analogous to charge, may recognize the greater practical importance of current, and might even be led to consider such unmentioned ideas as acceleration resonance. It is to the thinking student that this book will have much attraction.

Fourth National Symposium on Vacuum Technology Transactions (Boston, Mass., Oct. 1957). Edited by Wilfred G. Matheson. 176 pp. Pergamon Press, London & New York, 1958. \$12.50. *Reviewed by J. Arol Simpson, National Bureau of Standards.*

Under this rather awkward title are to be found twenty-eight papers presented at a symposium sponsored by the American Vacuum Society in October 1957. They are grouped in three descriptive, if not exactly terse headings: Scientific Basis of Vacuum Techniques and Their Application to Scientific and Applied Research, Methods and Techniques for Obtaining and Measuring High Vacuum and Ultra-High-Vacuum Industrial Applications, and Industrial Applications. Although all the contributions are concerned with vacuum technology they range from studies of the "Resistance-Temperature Characteristics of Evaporated Chromium Films" to "What Vacuum Melting Process Shall I Use?", touching all bases in between. Only a sales engineer of one of our major vacuum equipment companies could possibly be interested in *all* the papers and he probably was there and heard them anyhow.