

Atmospheric Research

Problems of Atmospheric and Space Electricity. Proceedings of the Third International Conference (Montreux, Switzerland), May 1963. Samuel C. Coroniti, Ed. Elsevier, New York, 1965. xiv + 616 pp. Illus. \$35.

Conference proceedings seem to have a way of taking about 2 years to emerge between hard covers; perhaps a significant fraction of that time is spent by the publishers in summoning up courage to set the high asking price. In the present instance, delay and high price are considerably offset by the generally high quality of the finished product. Coroniti's editorial work on this volume, and his efforts in planning the conference, deserve strong commendation.

The book follows the actual conference in that it is organized into seven topical subdivisions: Survey of the present status of atmospheric and space electricity; fair weather phenomena; stormy weather phenomena; thunderstorm charge-separation theory; physics of lightning; miscellaneous lightning phenomena; and "space electricity." There is an almost pleasant lack of uniformity in the editorial management of the large number of papers that are fitted into these subdivisions. One finds lengthy review papers and lively floor discussions interspersed with occasional quarter-page abstracts where some speaker wished to make only a single brief but emphatic point. It was initially planned that conferees should address themselves primarily to summarizing the state of the art and to stressing optimal modes of attack on unsolved problems. These objectives were well met in many review papers; the latter, by themselves, make the volume valuable. In addition, however, a substantial number of reports are concerned with original work. But the outstanding virtue of the published proceeding is the very full transcription of the floor discussions, which have been edited enough to make the speakers sound grammatical, but not so much that the vigor of controversy is lost. I recall no other conference proceedings characterized by so satisfactory a job in reporting floor discussions.

Of the many topics covered in the proceedings, two might be singled out for special comment. First, one finds that the long-standing mystery of how such prodigious charge-separation is

accomplished in thunderstorms seems to be almost as confusing as ever. The increasing amount of research being devoted to that fundamental question of atmospheric electricity seems to continue to lead to new questions and new answers in roughly equal proportion. Second, the conference made an initial effort to bring into the ambit of atmospheric electricity a broad array of near-space and planetary-atmospheric electrical phenomena, which are treated in the proceedings under the somewhat uninformative heading "space electricity." Several contributors urge that terrestrial atmospheric electricians should begin to turn some of their attention to the novel atmospheric electrical problems likely to be found once space probes begin taking a really close look at the physics of other planetary atmospheres; their case is convincingly made.

In all, these proceedings are editorially well handled and handsomely published. They can be strongly recommended for institutional libraries. Conferees and reviewers who get complimentary copies can sympathize with individual scientists who must sacrifice a day's wages in order to add this valuable volume to their personal reference collections.

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Applications of Ultrasonics

Ultrasonic Engineering. Julian R. Frederick. Wiley, New York, 1965. xiv + 379 pp. Illus. \$15.

This book is described by the publisher as a complete introduction to the industrial, laboratory, and medical uses of ultrasonics. I believe that this is an accurate description. Written by one of the scientists who has been instrumental in the application of ultrasound to the inspection of materials for flaws, the book emphasizes the applicability of ultrasonics to a wide range of processes.

Frederick begins with a chapter that discusses the basic principles of acoustics in very simple terms; the remaining chapters apply this knowledge to various ultrasonic processing applications. The general outline of an industrial process is divided into (i) a source of energy, (ii) a device for converting this energy into ultrasonic vi-

brations in solids, liquids, or gases—that is, a transducer, (iii) a coupling element to get the ultrasonic vibrations into the work as efficiently as possible, and (iv) the material which is modified in some way as a part of the process.

Various types of transducers are considered in chapter 4. These consist of air and liquid sirens and whistles, piezoelectric and electrostrictive transducers, and magnetostrictive transducers. In chapter 5, cavitation as a source of high pressure and various solid horns, which produce a large motion at the small end when driven by a small displacement transducer, are discussed.

The remaining chapters discuss the use of ultrasonic energy in cleaning processes, the production of aerosols, the combustion of fuels, the casting of metals, friction reduction, extrusion and wire drawing, grinding, welding, measuring liquid velocity, counting and sorting, density and viscosity measurement, and determining the elastic properties of liquids and solids. A complete chapter is devoted to flaw detection. This technique, which was invented in 1940 by Floyd Firestone (the book is dedicated to Firestone), is widely applied in industry. Two final chapters describe the application of ultrasonics to biology and medicine. This is a rapidly growing field from which much may be expected.

Altogether this book represents the most up-to-date description of the processing applications of ultrasonics that has yet appeared in book form. It merits a hearty recommendation to engineers who deal with ultrasonic processing and to those who wish to investigate the possibility of this rapidly growing branch of engineering.

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Science and Society

The New Priesthood: The Scientific Elite and the Uses of Power. Ralph E. Lapp. Harper and Row, New York, 1965. x + 244 pp. \$4.95.

We have been repeatedly indebted to Ralph Lapp for pointing out a number of embarrassing but important facts that public officials preferred not to face. He here raises the important subject of the scientific "elite." There