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equations describing the behavior of analogous electrical, rectilinear mechanical, rotational mechanical, and acoustical systems by impedance analogy. The equilibrium equations for the single degree of freedom systems are obtained by both force balance and power balance, and Lagrange's equations are used for systems with several degrees of freedom. Transient response is obtained for the step input and the general input by indicial admittance, but not by unit impulse response. There are good chapters on electrical-mechanical-acoustical transducers.

The new material is about 75 pages at the end of the book dealing with noise and distortion, magnetic analogy, feedback, and the mobility analogy. The chapters on noise and distortion and the magnetic analogy are brief but outline the subjects well. Some interesting applications of feedback are given, but the treatment is so abbreviated as to give an inadequate appreciation, particularly of the stability problem. The "mobility analogy", which is a method of obtaining an electrical analogy of a mechanical system by considering velocity as analogous to voltage and force to current, is thoroughly discussed.

There is little attention given to synthesizing analogous systems by logical procedures, but instead systems are presented by types; i.e., corrective networks and frequency filters, in which form the data is likely to be most directly useful. Because of this, and because the emphasis is on stating equations without detailed introductory derivations, the book is primarily an excellent reference rather than an explanatory text.

The Green Flash and Other Low Sun Phenomena. By D. J. K. O'Connell, S.J. 192 pp. (Vatican Observatory, 1958) Interscience Publishers, Inc., New York, 1958. \$6.00. *Reviewed by C. C. Kiess, National Bureau of Standards.*

Is the green flash a genuine meteorological phenomenon, or is it only a subjective experience? This question has been asked by many who have tried repeatedly to observe it, but without success. Among them may be counted both the reviewer of this book, who caught his first view of it only recently after many unrewarding attempts, and also its author, who confesses that after many unsuccessful trials, in various situations, he "saw it for the first time, and very clearly, at sunset over the Mediterranean from my office window at Castel Gandolfo". His aim in writing the book is to establish beyond all doubt the objectivity of the green flash from recent photographic evidence, free from psycho-physiological bias.

The textual matter of the book is brief and is intended to serve primarily as an introduction to the exhibit of photographs that it presents. The first section is historical and traces the story of the green flash from first mention of it in ancient literature to the more precise descriptions of it in recent observations. The second and third sections discuss the theories of the phenomenon, ranging from the purely physiological to those rep-

resenting the resultant of atmospheric dispersion, absorption, and scattering, with the consequent variations in its duration and appearance. The fourth section describes the work at the Vatican Observatory in which the reflector and refractor were used both at sunset and sunrise to get the green flash on color film, and also other effects associated with the horizontal sun. Various difficulties attended the work, but the outcome was a set of photographs that surpass in variety and detail any published heretofore. Sixty pages of the book are devoted to the best of these pictures of which 80 are in color. Each page of illustrations is accompanied by adequate captions detailing the circumstances under which the pictures were taken.

This book constitutes a work of prime importance in meteorological optics and is a valuable addition to its literature. Through text, illustrations, and bibliography it offers incentive and inspiration to those who are "watchers of the skies".

Energy for Man: Windmills to Nuclear Power. By Hans Thirring. 409 pp. Indiana U. Press, Bloomington, Ind., 1958. \$6.95. *Reviewed by E. R. Rae, A.E.R.E., Harwell.*

In his introduction to this book, Professor Thirring sets out what in his estimation are the three great tasks facing mankind. These are the problems of supplying an ever-increasing world population with food and with power and of educating men so that they may lose their prejudices and gain the ability to work together. Of these three problems, he says, the third is probably the most noble, and the first (food production) the most urgent. This book, however, deals with the second problem, that of providing the energy to heat our homes and to drive the wheels of industry and transport.

Professor Thirring tells the fascinating story of the development of the production of power, from the days of antiquity, of slave labor and wood fires, through the age of coal and the steam engine, gasoline, the internal combustion engine, and the gas turbine, to the threshold of the nuclear age. He tells of the prodigal waste of fossil fuels, of the great reduction in modern estimates of the total world supply of these commodities, and of the urgent need to conserve the remaining supplies. He weighs up the possible contributions to our energy supplies from replaceable fuels like wood, farm wastes, and alcohol, from water power, solar energy, tidal energy, and from the internal heat of the earth. All these sources of energy are discussed in critical detail, and it is shown that while they can make a considerable contribution to our needs, they cannot, by themselves, support a world-wide industrial civilization.

The last three chapters of the book describe the development of nuclear physics, the discovery of nuclear fission, the principles of a fission reactor, the types of reactor being developed today, the successes achieved, and the hopes for large-scale nuclear power supplies. The world stocks of fissile material are shown to be enough for several millennia, and the key position of

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