field. Yet Figure 84 was noted to have reversed captions, and the discussion on page 107 left a bit of confusion over finding "a peak . . . at about 45° K and a minimum . . . at about 75° K" by measurements "in the temperature range from 1.6°K − 8°K". The author states on page 102 that the experimental finding of ultrasonic scattering varying directly with frequency "is probably an approximation to the theoretical form of the scattering curve". Presumably an equivalent statement would be that the finding is in agreement with the theoretical scattering curve.

In brief, *Relaxation Spectrometry* should serve as a useful introduction to many before relaxation becomes a long lost art.

Optics. By Bruno Rossi. 510 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass., 1957. $8.50. *Reviewed by V. Twersky, Sylvania Electronic Defense Laboratory.*

This well written and well organized text starts with elementary geometrical optics, and continues through diffraction, polarization, electromagnetic theory, and on to photons and complimentarity. The presentation more or less traces the evolution of the concepts basic to optics, and the progression from the early mechanical analogs to the more abstract mathematical models should leave the student with an appreciation of how a scientific discipline develops. The problems are well chosen to supplement the text and to give a quantitative appreciation for the magnitudes of various phenomena; answers are given to half. Using essentially elementary methods (only slight knowledge of calculus is assumed) the book goes rather deeply into various topics which are barely touched on in analogous texts; e. g., Huygens' principle, rays in nonhomogeneous media, Abbe's theory of image formation, the propagation of electromagnetic waves, and radiation from an accelerated charge. Although other topics could have benefitted from the same treatment, and although the utility of the material could have been increased by supplementary bibliographies, the book as it stands is perhaps the best available for an intermediate course.

Scientific Uses of Earth Satellites. Edited by James A. Van Allen. 316 pp. The U. of Michigan Press, Ann Arbor, Mich., 1956. $10.00. *Reviewed by Arthur Beiser, New York University.*

In January of last year the Upper Atmosphere Rocket Research Panel met in Ann Arbor to discuss experiments that could be performed with the aid of artificial satellites and to consider in some detail the specific instrumentation that would be required. Thirty-three of the papers presented there have been collected and edited by James A. Van Allen, the chairman of the panel, into a handsome volume which, while parts of it are already obsolete and some of the rest no doubt headed for a similar fate, still retains enough solid information to justify its publication. As might be expected, all sorts of topics are covered, from albedo to x-rays, but they have unfortunately not been indexed. The first dozen or so papers concern themselves with the flight of the satellite—its orbit and expected perturbations, drag, tracking, etc. The rest deal with phenomena for whose measurement a satellite might prove ideal—cosmic rays, ultraviolet radiation, auroral streams, geomagnetism, ionospheric structure, meteors, interplanetary dust, and the cloud cover of the earth. One may conclude from this book that the satellite program is in imaginative as well as thorough hands.

Relaxation Methods in Theoretical Physics. Vol. 2. By R. V. Southwell. 522 pp. Oxford U. Press, New York, 1956. $8.80. *Reviewed by R. B. Lindsay, Brown University.*

This is the second volume of a continuation of the author's book *Relaxation Methods in Engineering Science,* which appeared in 1940 and which was expanded in the first instance in a volume bearing the present title, published in 1946. The three books form, therefore, an extended treatise on the interesting method of approximate computation which the author has developed over a period of years for handling difficult boundary value problems in physics. Such problems involve in the main second and fourth order ordinary and partial differential equations.

The relaxation scheme of approximate solution stems from the so-called "Moment Distribution Method" of Hardy Cross in the solution of girder frameworks in engineering statics. However it has been extended by Southwell to problems in dynamics as well, including among others the vibrations of nonuniform membranes and electromagnetic oscillations in Klystron tubes. By and large the present volume is devoted to stress and strain analysis in two-dimensional continua, though three-dimensional problems are briefly touched on.

In essence the relaxation method replaces any continuum whose behavior is being studied by a discrete net of values of the independent variable or variables. In the differential equation describing the system the derivatives are replaced by finite differences involving values of the wanted function at various points in the net. If the correct solution were known (including of course the assigned boundary values) substitution into the sum of all derivative terms plus the known functions entering into the equation would naturally yield zero for all points of the net and its boundary. However, for arbitrarily chosen values of the wanted function at each net point the above expression has a *residual* nonvanishing value. The idea of the method is (by finding out how much change is produced in the values of the residuals when the value of the wanted function at a single net point is changed by a small but otherwise arbitrary amount) gradually by successive trials to "relax" the residual at every net point to zero.

The book contains a host of practical hints for facilitating this process in connection with numerous important problems. However, it is clear that any reader who desires to use the method must develop his own com-