

## BOOK REVIEW

### Continuum Mechanics

**Continuum Mechanics.** By P. G. Hodge, Jr. McGraw-Hill, New York, 1970; XVI and 251 pp. Price: \$12.50.

REVIEWED BY T. G. ROGERS<sup>1</sup>

There has long been a need for a good introductory text on the basic theory of continuum mechanics. Although there now exists a number of learned treatises on the unified theory, they are not appropriate for beginners who are not in a position to critically assess the various treatments.

Professor Hodge's text goes a long way toward meeting this need. It is clearly written, a welcome addition to the literature, and a suitable text not only for undergraduate engineers, as advertised, but also for undergraduate applied mathematicians.

The reader is gradually introduced to the basic concepts of continuum mechanics by means of successively describing one, two, and eventually three-dimensional continua. The book is self-contained in the sense that most of the mathematics required is described in the text, and is in fact given equal emphasis with the physical concepts.

The first five chapters (or almost half the book) deal with the

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theories of one and two-dimensional continua and the tensor calculus, which is sensibly treated in terms of Cartesian tensors. The remainder of the book is concerned with the theory of three-dimensional continua, introducing in turn the balance laws, kinematics, energy, and, finally, constitutive equations. Each chapter ends with a considerable number of problems which form a valuable supplement to the main text; some topics are developed only within the problems.

There is little with which one can reasonably find fault. It is regrettable that the chapter on constitutive equations is restricted to 20 pages, enabling the author to deal only briefly with fluids, linear elasticity, and rigid-plastic behavior, and I have reservations about the treatment of frame indifference. Its definition is different from that usually given for either "frame-indifference" or "invariance under superposed rigid-body displacement;" indeed the text would imply to the uninitiated that the stress in a continuum experiment would be unchanged even if the velocity field were changed by a constant rotational velocity about a fixed point! My final criticism is due to no fault of the author—the price of the book seems to be inordinately high (\$12.50 in the U. S., more than £6.00 in the U. K.) and is sure to result in a large number of interested people being without a copy; this is particularly regrettable when most of those affected are students.

In conclusion, I would warmly recommend this book.