Creep in Structures. *Nicholas J. Hoff (Editor). Colloquium held at Stanford University, California, 11th-15th July* 1960. *Springer Verlag, Berlin.* 1962. 375 *pp. DM* 54.

The first experiment on creep buckling was probably that made by Eaton Hodgkinson about 1890 when he recorded that a cast-iron pillow one inch in diameter and six feet long supported a load of 1,456 lb. for five or six months and then broke. Meanwhile, William Fairbairn, busy testing model tubes of wrought iron for the Britannia tubular bridge, was noting with satisfaction that, although the deflection of the tube under five times working load increased from $3\frac{1}{4}$ to $3\frac{1}{2}$ inches in 19 hours, under three times working load a similar increase took 20 days. Were these two gentlemen present in spirit at Stanford in July 1960, probably they would have found much to approve and perhaps even more to deplore.

If the twenty papers are printed in the order in which they were delivered, Fairbairn anyway could barely have endured the first half. He would scarcely have recognised his old familiar wrought iron as a viscoelastic material, nor have seen in the disappearance of the shear centre the key to Robert Stephenson's apprehension of the dangers of twist. His appetite would have been whetted by the titles to the first eight papers with their several references to beams, plates and membranes, to combined stresses, varying load and temperature and incremental loading; but, listening, he would certainly have concluded that "to go into such laborious and obstruse calculations was beyond his power"; and he would have fled at half time "to rest the basis of his calculation entirely on the experimental facts as deduced from tests on the proper models."

Of course, the practical designer is always liable to run back to old fashioned methods; but it is simply no use improving mathematical techniques and complicated aids without at the same time developing the means to communicate the improvements to the practical designer. Had Fairbairn survived to the ninth paper he would have pricked up his ears. The term "oil canning" would have been strange to him and the references of course unknown; the notation is deplorable and the mathematics poorly set out; yet the description of the process is so lucid that these drawbacks scarcely hinder understanding of the way in which creep may contribute to snap action. Even better are later papers on the mechanics of column creep, and on the "geometrically non-linear creep buckling of bars" (the worst feature of the latter paper is its title—it means very large deflections, as of an archer's bow; in fact the elastica, only not elastic). Several others of the last twelve papers are quite readable and they should encourage the reader to take another look at those he skipped first time.

The editor brings up the rear with a study of damping in the vibration of a helical spring. It is a pity that the post of editor, *qua se,* seems to have become a sinecure; had this set of papers been really thoroughly edited—notation, layout, style and all else—its value would have been enormously enhanced.—H. L. COX.

The Chemical Composition and Properties of Fuels for Jet Propulsion. *Ya. M. Paushkin. Translated by W. E. Jones and edited by B. P. Mullins. Pergamon Press, London.* 1962. 480 *pp. Illustrated.* £5 0*s.* 0*d.*

This is a book which will remain outstanding as an introduction to the physical and chemical aspects of jet propulsion fuels for a long time. Although the book is not written for specialists in fuel technology, the amount of data contained on the various properties and aspects of fuels and oxidants and the extensive lists of references will undoubtedly encourage the specialist to use it for general reference. The student and engineer who are commencing work in this field will find the book of great value, but tedious to read in places, on account of the vast detail on each topic and the broad treatment of the subject as a whole.

The book is equally divided in its coverage of fuels for air-breathing jet propulsion engines and the fuels and oxidants associated with rocket propulsion. The first section, dealing with fuels for air-breathing engines, gives emphasis to the physical and chemical properties with particularly useful tables and figures for hydrocarbons found in current fuels. In these early chapters, much welcomed information is given on the specifications and characteristics of fuels used in the U.S.S.R. Adequate discussion is given to operating characteristics such as pumpability, and boiling losses, with particularly good treatment of fuel stability and anti-oxidants. Although seemingly out of place in a book devoted to jet-engine fuels, the final chapter in Section One dealing with natural and synthetic lubricants is a useful addition. It is, however, regrettable that organo-silicon compounds are discussed only briefly.

The second half of the book is divided into two well-balanced sections, the first dealing with fuels for liquid propellant engines and the second with associated oxidants. Although physical and chemical properties are discussed in these sections, more emphasis is given to ignition and methods of determining ignition delay times for various propellant combinations. The chapter covering hypergolic propellants is particularly useful in this respect, but unfortunately is confined to nitric acid and oxides of nitrogen.

The presentation of the book on the whole is good, with numerous line diagrams and photographs of apparatus for the determination of fuel properties. With the exception of Table 15, few mistakes could be found in the data presented. The translator and editor of this valuable book must be congratulated on their difficult task in making it available to readers in this country.—E. R. NORSTER.

Introduction to Radar Systems. *Merrill I. Skolnik. McGraw-Hill Book Co., London and New York.* 1962. 648 *pp. Illustrated.* £5 12*s.* 6*d.*

In the twenty years since we were first told publicly of the existence of radar the art has grown to such a vast extent that it now occupies a major fraction of the radio industry of the world. "Introduction to Radar Systems" seeks to describe this art as it stood towards the end of 1961.

The book, based on a graduate course on radar systems engineering, is intended both for students and practising engineers. The fourteen chapters fall into four main groups. The first group includes an historical introduction, and descriptions of the physical and mathematical bases of the practical methods adopted. These cover pulse and F.M. systems, methods of moving target indication and tracking.

The second group describes the elements of systems such as transmitters, aerials and receivers. The third deals with the processing of information in general, particularly in the presence of noise and interference. The fourth describes some of the more recent typical systems, with a special chapter on extra-terrestrial radar problems.

The book covers a wide field and it is refreshing to find such a clear and objective an account of the development of radar. It has references to more than a thousand original papers mostly centred in the later 1950's. The section on signal processing takes the story up to the most recent University of Michigan aerial synthesis work and is most useful.

There are nevertheless occasions when the determination to give a brief explanation of everything leaves the uninitiated less clear after reading it than before. It is perhaps surprising too that secondary radar is met so late in the book. Transponders first appear briefly as elements in electronic countermeasures apparatus and secondary radar proper is dismissed elsewhere in a mere half-dozen pages.

These are, however, trivial criticisms of a most valuable book, excellently illustrated.—H. A. DELL.

Gyroscopes: Theory and Design. *Paul H. Savet (editor). McGraw-Hill, London.* 1961. 402 *pp. Diagrams.* 99s.

This book is compiled from the contributions of eleven authors and is a remarkably comprehensive work; indeed, it is likely that the detailed coverage was possible only by enlisting a team of specialists. It is based on a series of lectures at Adelphi College, Garden City, New York, by members of the scientific and engineering staff of the American Bosch Arma