instability although this is an obvious field for use of the displacement approach[3].

Another shortcoming of velocities is that they are not as convenient for use in conjunction with Lagrange's equations. The matrix equation:

$$\mathbf{A}\ddot{\mathbf{q}} + \mathbf{B}\dot{\mathbf{q}} + \mathbf{C}\mathbf{q} = \Phi e^{\lambda t}$$

relating to a system having n degrees of freedom has to be expressed as a form of integral equation if it is couched in terms of generalized velocities (**A**, **B** and **C** are the square inertia, damping and stiffness matrices, respectively, **q** is a column matrix of generalized displacement and Φ is a column matrix representing amplitudes of generalized applied forces, λ being a complex constant). Some idea of the sheer power of the displacement approach may be had from Duncan's pioneering work[3], much of which has no counterpart in the literature as it relates to the velocity outlook.

To be sure, the choice between these techniques is to some extent—perhaps largely—a matter of taste. But to regard this as being entirely a matter of taste would be obtuse. A critical appraisal of the present position, particularly in the light of recent work in automatic control, is still highly desirable.

R. E. D. Bishop

[1] Greenhill, Sir George, "Notes on Dynamics", 78 (London: H.M. Stationery Office, 1908).
[2] Yates, H. G., *Trans. N.E. Coast Inst. Eng. and Shipb.*, **65**, 225 (1949).
[3] Duncan, W. J., *R. and M.*, 2000 (1947).

FRICTION IN TEXTILES

Friction in Textiles

By Dr. H. G. Howell, K. W. Mieszkis and Dr. D. Tabor. Pp. xii+263. (London: Butterworths Scientific Publications; New York: Textile Book Publishers, Inc., 1959. Published in association with the Textile Institute.) 42*s*.

In a traditional industry, such as the textile industry, practice has been and, in many aspects still is, ahead of theory. This situation has arisen because able men have had an abundance of time to solve technical problems empirically. During the past few decades, however, a host of new problems has been presented to the textile industry. These problems arise from three main factors: the advent of man-made fibres, in both continuous filament and staple form, the increasing cost of labour and the increasing emphasis on, and uniformity of, quality. The consequences of these changes are the introduction into the industry of high-speed machinery, of control instruments and of an increasing number of scientifically trained men. The Textile Institute is therefore to be congratulated for encouraging the publication, in association with the publishers, of books which relate textile technology to the background of scientific knowledge.

The first result of this association is the publication of the book "Friction in Textiles". This book is in three sections; the first one is a readable summary of current views on friction, in which the limitations as well as the successes of current theory are given a just emphasis. The second part, entitled "Friction in Textile Processing", contains an account of the special frictional properties of wool, followed by chapters on the importance of friction in the different processes through which fibre passes on its way to the finished cloth. It is a measure of the current state of knowledge that all the textile processes can be dealt with in less than sixty pages, compared with twenty-one on the frictional properties of wool and about seventy in the third section of the book, on methods of test.

Scientifically and technologically, the middle section of the book is least successful. Its value, however, is probably greater for the textile technologist than that of the first and last sections, because it represents a brave attempt to give a coherent account, based on the little data available, of a dominant factor in textile processing, namely, friction. The reviewer hopes that textile scientists will read this and be stimulated to carry out the research which is so clearly necessary.

ADVANCEMENTS IN METALLURGY

Constitution of Binary Alloys

By Dr. Max Hansen. Second edition prepared with the co-operation of Dr. Kurt Anderko. (Metallurgy and Metallurgical Engineering Series.) Pp. xix+1305. (London: McGraw-Hill Publishing Company, Ltd., 1958.) 252*s*.

Metallurgical Thermochemistry

By Dr. O. Kubaschewski and E. Ll. Evans. (International Series of Monographs on Metal Physics and Physical Metallurgy, Vol. 1.) Pp. xiv+426. (London and New York: Pergamon Press, 1958.) 63*s*. net.

Vacancies and Other Point Defects in Metals and Alloys

A Symposium organized by the Institute of Metals and held at the Atomic Energy Research Establishment, Harwell, Berks., on 10 December 1957. (Institute of Metals Monograph and Report Series, No. 23.) Pp. iii+234+16 plates. (London: Institute of Metals, 1958.) 40*s*.; 6 dollars.

Vacuum Metallurgy

Lectures presented during the course on Vacuum Metallurgy sponsored by the Department of Metallurgical Engineering in co-operation with the Office of Special Service to Business and Industry, New York University, New York, June 10–14, 1957. (Materials Technology Series.) Pp. xviii+472. (New York: Reinhold Publishing Corporation; London: Chapman and Hall, Ltd., 1958.) 100*s*. net.

A Dictionary of Metallurgy

By Dr. A. D. Merriman. Pp. xv+401. (London: Macdonald and Evans, Ltd., 1958.) 126*s*.

The rate of growth of metallurgical knowledge and experience is resulting in a flow of publications covering many diverse fields from many countries and, it must be admitted, of widely differing quality. The five books here reviewed are, however, valuable contributions to their own fields of science or technology.

The first German edition of Dr. Hansen's "Constitution of Binary Alloys" was published in 1936, and immediately gained for itself an honourable place in all laboratories where work on metallic alloy systems was being pursued. With the passage of years this edition became progressively less complete and this new and up-to-date one is, therefore, most