geometric considerations of first and second order for motions in space, beginning in particular with the study of ruled surfaces and axial planes, then of orbits and envelopes.

There is an appendix containing two notes, one on the concepts of surface area and volume, the other on non-euclidean mechanics of points and rigid bodies. Numerous exercises and figures and a detailed index enliven and facilitate the use of this distinguished work. Many-parameter motions and integrals of kinematics are hardly touched upon.

W. BLASCHKE

Dictionary of mathematical sciences. Vol. 1, German-English. By Leo Herland. New York, Ungar, 1951. 235 pp. $3.25.

This is an ambitious and fairly successful attempt to provide mathematicians with the English equivalents of German mathematical terms. The arrangement, the typography, the elaborate system of cross-references and illustrative phrases are all excellent. In most cases the author has avoided the obvious pitfalls of using the English cognate word instead of the English idiom, or of always using the same translation for the same German word. Thus for example *Fakultät* comes out correctly as "factorial," and *Satz* in compounds is "theorem," "law," or "condition" according to the context. Presumably for the benefit of anyone who has to listen to lectures in German, the spoken use of such words as *hoch* (as in *fünf hoch ein Viertel*) is included. The chief adverse criticisms which have to be made are a lack of completeness and a lack of accuracy, both of which could have been avoided if the author had consulted specialists in several branches of mathematics, as he did consult specialists in commerce and statistics for the technical terms in these fields. The dictionary also covers such fields as logic, physics, and astronomy to some extent, but the comments in this review will be confined to its coverage of mathematics proper.

According to the preface this dictionary centers "about the major subjects of mathematics and geometry" [one wonders what the author considers mathematics to be, if geometry is not a part of it]; it "does not claim completeness, although the aim has been to include all important terms." As far as concerns arithmetic, elementary algebra, the less specialized forms of geometry, calculus, the elements of set theory and of the theory of functions, the coverage is quite thorough; a brave attempt has been made to cover abstract algebra; but topology and applied mathematics are practically omitted. The latter omission seems particularly serious since applied mathematics contains an abnormal number of technical terms whose meanings are not readily guessed from their appearance. To select a few examples at random, one does not find *hebbar*, and the translations given for *heben* do not illuminate the missing word; *Simplex*, *Zelle*, *Spaltung*, *Primende* are all missing; *Deckung*, *Bedeckung*, and *Überdeckung* are not there, although *decken* is, in contrast to a spirit of inclusiveness which leads to separate entries for *x-Achse*, *y-Achse* and *z-Achse*; the German words for "layer," "beam," "plate," "buckle," "viscous" are missing, and *Schale*, *Torsion*, *beugen* appear in geometrical or optical senses but not in mechanical ones. In algebra, *Verband* is perhaps the most serious omission; another kind of lattice is, however, represented by *Gitter*. One misses *schlicht*, and the omission cannot be excused on the grounds that the German word is frequently used as its own translation, since on the one hand it is also frequently rendered by "univalent" and on the other hand *Nullstellensatz* is correctly rendered in this dictionary as "Nullstellensatz." Only "convolution" and not "Faltung" is given as the translation of *Faltung*. As technical a term as *totalpositiv* is there, but not *vollmonoton* or *vollstetig*; there is a column of *Quadrat-* words, but not *quadratfrei*.

There are only a few quite serious incorrect translations. The author correctly gives *vollkommen* as "perfect," but fails to realize that *perfekt* (in algebra) should be "complete." *Mehrdeutig* is translated as "ambiguous," which is incorrect at least when applied to functions. However, too often only one of several common meanings is given: *Ansatz* appears only as applied to the "arrangement of an equation"; *ganz*, as applied to a function, is missing; one can *mitteilen* a meaning or a motion, but not a theorem or a paper; *Verzerrung* is "deformation" but not "distortion"; *Einheit* appears as a unit of measurement or a number, but not as a unit in the algebraic sense.

Less serious are translations not conforming to current English usage, such as "permanently convergent series" for *unbedingt konvergente Reihe*; *Monotonie* = "monotony"; *Quader* = "right parallelepiped"; *umfassen* (a set) = "comprehend"; *phasisch* = "phasic." *Natürliche Zahl* is rendered only as "natural number," not as "positive integer"; *semikonvergent*, as "semiconvergent," not as "asymptotic"; and *Teilerkettensatz* comes out quite literally as "divisor chain condition." Some translations such as these would do no worse than lead a German to write unidiomatic English; but others would be likely to confuse anybody who has to consult mathematics in both languages.

Deficiencies such as these seriously limit the usefulness of this dictionary either for the student or the working mathematician. In its present form it can be of considerable help, but it can hardly be considered authoritative. It is to be hoped that a second edition of increased scope and greater accuracy will be prepared. If the deficiencies of the present edition can be remedied and its good qualities retained, it will be of great value to mathematicians.

R. P. BOAS, JR.

The mathematical theory of plasticity. By R. Hill. Oxford, Clarendon Press, 1950. 10+356 pp. $7.00.

Although it is more than eighty years since the foundations of the theory of plasticity were laid by Tresca, Saint Venant, M. Lévy, and others, plasticity is still a very young science. After a first strong wave of interest (about 1913–1930), work in this field has slowly but steadily increased and recent years have seen a marked upsurge of interest; this can best be illustrated by the fact that in 1950 no fewer than four very serious books on the subject appeared, by A. M. Freudenthal (Wiley), by R. Hill, by A. Nadai (McGraw-Hill), and a comprehensive survey report by P. G. Hodge (Brown University Notes); in 1951 followed a textbook by Prager and Hodge (Wiley). Among those works Freudenthal's book differs from the others by its wider scope; plasticity as understood in the other books forms only a chapter, although one of central importance, in Freudenthal's approach, since his viewpoint is primarily that of a physicist and technologist. Hill's book is an advanced and comprehensive text, intended as an orientation for engineering scientists and applied mathematicians rather than as a textbook for students; on the other hand Hodge and Prager's useful and interesting book is planned for students on an intermediate level.

Hill's important book presents those aspects of plasticity which so far have been more or less "mathematicised"; by this word we mean that a rational theory which forms part of a larger scientific unit (the science of mechanics) is formulated in mathematical terms. This is true in particular for that part of plasticity theory which is known today as the theory of the "ideal" or "perfect" plastic body. Such a body is described mathematically by the system of equations at the basis of the theory. We may, however, point out a few features: (a) The equations deal only with stresses and deformations at a fixed moment; after the whole configuration is determined for an instant the investigation may be repeated if necessary for the next moment; (b) thermal phenomena are disregarded; (c) work hardening and related phenomena are in general neglected, etc.