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Review

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occurs with discontinuous motion in three dimensions, and it is bound to occur in cases other than those of steady motion—for example, eddy formation in the rear of planes. It is no use for Sir William White to urge mathematicians to obtain a hydrodynamical solution of the problem of the screw propeller.

In these days of over-elaboration, the small size of the book is an advantage. It is particularly suited for engineers and engineering students, who will doubtless find the explanations very helpful.

G. H. BRYAN.

Engineering Applications of Higher Mathematics. By V. KARAPETOFF. Part I. Problems on Machine Design. Pp. xiv + 69. \$0.75. 1912. (John Wiley & Sons, New York.)

This book is the first of a series, in which the author intends to discuss typical problems in the various branches of Engineering. Subsequent volumes of the series will deal with Hydraulics, Strength of Materials, Thermodynamics and Electrical Engineering. The problems are all well chosen to illustrate the applications of various branches of Mathematics, and have no connection the one with the other, with the result that the student can choose any chapter that deals with a subject in which he is particularly interested. The first problem dealt with is the Inclined Plane and Screw, and in this the analysis is mainly trigonometrical. The remaining problems deal with Friction in Journals and in Step Bearings, Carrying Capacity of Belts, Torsion of Shafts and Moments of Inertia of Flywheels. These are treated mainly with the aid of the Calculus. Each problem is worked out in detail, and the mathematical analysis shows considerable ingenuity and freshness. Problems, to be worked by the student, are suggested at the end of each chapter on the subject matter which has been discussed. The scheme of the book is admirable, and no student of Engineering can fail to benefit by working through any one of the chapters of which the book is composed.

It would seem from the preface that not so many years ago the teaching of Mathematics to Engineering students in America was at least as much divorced from the practical side as it was in England, and the author pays a generous tribute of praise to Professor Perry and to his *Calculus for Engineers* for his pioneer work in Engineering Education.

Strength of Materials. By H. E. MURDOCK, M.E., C.E. Pp. xiv + 296. n.p. 1911. (John Wiley & Sons, New York.)

In this work we have a complete discussion of the subjects generally dealt with under the title of "Strength of Materials." In the chapters on Direct Stresses, Rivetted Joints, Shearing Force and Bending Moment, the usual results and formulæ are clearly stated. Diagrams are used extensively, and they are in nearly all cases clear and convincing. Special attention is given to the mathematical connection between Load, Shear and Bending Moment Diagrams, a point which frequently receives but scant notice in text-books. Though no objection can be taken to the introduction of the method of Graphic Integration as giving the student "an additional avenue of conception" (*preface*), and as indicating clearly the meanings to be attached to the various constants of Integration, yet when this method is actually applied to the determination of the slope and deflection curves for Continuous Beams, it becomes so tedious and dull as to defeat its own end. The author should have remained content with applying the method to the simpler cases. The usual way of deducing these curves by integration of the equation $\frac{d^2y}{dx^2} = \frac{M}{EI}$ is given in an admirably short and concise chapter. The book concludes with short chapters on Secondary Stresses, Columns and Struts, Torsion of Shafts, and Resilience, and Hysteresis, which afford good introductions to these branches of the subject.

R. M. MILNE.

Examination Papers in Mathematics. By P. A. OPENSHAW. Pp. 135; with answers. Price 1s. 6d. (Bell & Sons.)

This collection of examination papers set for Entrance Scholarships at the Public Schools is chiefly designed for the guidance of Preparatory Schools. It might well serve a wider purpose in providing material for revision exercises in other schools, a large number of the examples being original in type, such as are not usually met with in the generality of text-books.