Dynamics of the Airplane. By K. P. Williams. New York, John Wiley and Sons. 136 pages.

This little volume is number 21 of the series of Mathematical Monographs edited by Mansfield Merriman and R. S. Woodward. The author states that it is an outgrowth of a set of lectures delivered at the University of Paris by Professor Marchis for the benefit of the students of the American Army.

The subject of aeronautics as usually given includes both rigid mechanics and fluid mechanics. The latter, however, is not of so much importance for elementary considerations and has been omitted from the book under consideration. The omission does not interfere with the understanding of the dynamics of the airplane even when we include Bryan's mathematical theory of stability and Wilson's treatment of the effect of gusts. Almost all mathematical problems of the airplane can be treated with no more fluid mechanics than is usually given in a good college course in physics.

The more elementary subjects usually considered in a book of this character are: pressure on a plane and curved surface, movement of the center of pressure as the inclination of the plane is varied, the relation of the velocity of flight to the angle of incidence of the wing, power consumed, ascent, descent and circular flight. These subjects are adequately and delightfully treated in the first four chapters, 68 pages. The fifth chapter is devoted to the propeller. The principle topics discussed are form of the blade, thrust, power and efficiency. The formulas obtained for these are

$$T = \alpha V^2 D^2, \qquad P = \beta n^2 D^5, \qquad E = TV/(550\ P),$$

where n denotes r.p.s., D denotes the diameter of the propeller, α and β are functions of V/nD. The last part of the chapter is devoted to the experimental determination of the functions α and β and the adaptation of the propeller to the machine. Chapter VI, on performance, discusses the highest attainable altitude and the radius of action together with the effect of loading on these. Chapter VII on stability and controlability discusses in a general way the meaning of stability and the effect of stabilizer, elevator, etc. Chapter VIII treats Bryan's theory of stability. The rigid mechanics necessary is not developed here but reference is made to Routh.

The book is well written, very attractive in appearance, and makes a splendid introduction to the subject.

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