properties of the solutions and their expansions in Fourier series and the corresponding expansions of solutions that are not periodic; and the expansions in series of Bessel functions and of products of Bessel functions and the asymptotic expansions for large argument values. Powerful methods are given for computing the characteristic numbers and the coefficients in the expansions.

The applications fall naturally into two classes. Parametric resonance in dynamical systems where Mathieu's equation is to be considered the simplest special form of Hill's equation—also treated in Part I; and the solution of two-dimensional problems by separation of variables in elliptic coordinates, described for the wave equation also in Part I. The representative applications in Part II of the first class include treatments of amplitude distortion, frequency modulation, and sub-harmonics; of the second class the vibrations of elliptical membranes, plates, and lakes; eddy currents and thermal diffusion in elliptic cylinders; the propagation of electromagnetic waves in elliptical wave guides; and the diffraction of waves by elliptical cylinders. These, and the other applications given, should enable the reader to apply the theory to new cases as they arise.

The only large part of the theory not given is that connected with the treatment of the equation in terms of the singular points of its algebraic form.

The book is beautifully printed and a pleasure to read; it fulfills a long felt want and will take its place alongside Watson's *Bessel functions* as a necessary part of the equipment of an applied mathematician.

L. H. THOMAS

Algèbre et analyse linéaires. By A. Lichnerowicz. Paris, Masson, 1947. 316 pp. 800 fr.

This book is an introduction to linear mathematics for physicists based on lectures given by the author at Strasbourg. It is designed to fill in part the gap left in French scientific literature by the absence of works in French similar to the German treatises of Courant and Hilbert and of Frank and Mises.

The book has two parts, one on linear algebra and one on linear analysis, and each part is divided into four chapters. The first three chapters of Part I and the last three chapters of Part II present the standard elementary material on linear operators and bases in vector spaces with applications to the theory of expansions in orthogonal systems of functions and to the theory of integral equations. The middle two chapters present the algebra and analysis leading up to