following each other under equal angles $2/\pi n$. In symbolic notation, advance or rotation through an angle $2\pi/n$ is represented by multiplying by the quantity $\cos 2\pi/n + j \sin 2\pi/n$, and so the E.M.F.'s of a polyphase system are

$$E, \quad E\left(\cos\frac{2\pi}{n} + j\sin\frac{2\pi}{n}\right), \quad E\left(\cos\frac{4\pi}{n} + j\sin\frac{2\pi}{n}\right), \text{ etc.}$$

In chapters XXVI and XXVIII the author handles this application for the deduction of the expression for the rotating magnetic field, the ring and star E.M.F.'s of interlinked systems, and other matters of general use, but up to this time wanting an analytical expression.

The writer has only gratitude to express at the appearance of this work, and his one regret is that its author did not also include in it his recent articles on the rotary converter.

JOHN B. WHITEHEAD, JR.

JOHNS HOPKINS UNIVERSITY,
April 18, 1901.

SHORTER NOTICE.

Leçons Nouvelles sur les Applications Géométriques du Calcul Différentiel. By W. DE TANNENBERG. Paris, A. Hermann, 1899. 192 pp.

THIS volume, which M. de Tannenberg has contributed to the literature of the theory of curves and surfaces, is very opportune. We have wanted a book which would make possible for the beginner a knowledge of the more fundamental geometrical applications of the calculus and in a way which would prepare him for the treatises of Darboux and Bianchi. To be sure, this field has been covered, more or less, in the chapters devoted to geometrical applications in the French treatises on analysis—notably by Jordan, Picard, Appell—but rather as examples of the methods of analysis and not standing forth as a systematic development of the elements of another field of mathematics. Again, there have been in recent years, quite a number of shorter treatises with just the scope of the volume under discussion, but their treatment of the subject has been along lines quite different from the well known methods of the calculus: Ricci in his Lezioni arrives at the results by the study of