have also proved that a field of type (9) is self-conjugate* and is such that the flow of energy (Poynting's vector) is along the radius from (ξ, η, ζ, τ) to (x, y, z, t), hence it follows that the different æthereal fields given by (9) form a mutually conjugate system.

There are still many questions to be answered before the present theory can be accepted. If the æther is regarded as built up of elements a law describing the mutual action of two elements is needed. The nature of the macroscopic equations satisfied by the vectors (E, H) in a region occupied by an enormous aggregate of singular curves of æthereal fields has not been ascertained. The field obtained by superposing all the æthereal fields is probably different in character from an ordinary electromagnetic field; it may possibly have some connection with the phenomena of gravitation.

> Johns Hopkins University,
> Baltimore,
> *October* 27, 1914.

SHORTER NOTICES.

Handbuch des mathematischen Unterrichts. Von W. Killing und H. Hovestadt. Band II. Leipzig and Berlin, Teubner, 1913. x + 472 pp.

The general character of this work was discussed by the reviewer in the Bulletin, volume 17, No. 5. The vigor which characterized the first volume is unabated in the present one, which is devoted to trigonometry. One third of the volume is devoted to plane trigonometry, an equal amount to solid geometry or stereometry in which plane trigonometry is used freely in dealing with space problems, and the remainder to spherical trigonometry. There is sharp criticism of the ordinary text-books on trigonometry, in which the authors deplore the tendency to limit the field to goniometry and the solution of triangles with and without logarithms. Nor are they satisfied with a criticism of the content, for the methods of proof come under fire as well. As an illustration of the carefulness of their investigation, four proofs of the addition

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* E, p. 12; *Phil. Mag.*, Jan., 1914.