

Hestenes, David

A unified language for mathematics and physics. (English) [Zbl 0596.15027](#)

Clifford algebras and their applications in mathematical physics, Proc. Workshop, Canterbury/U.K. 1985, NATO ASI Ser., Ser. C 183, 1-23 (1986).

[For the entire collection see [Zbl 0588.00016](#).]

This is the introductory lecture for a symposium on Clifford algebras and their applications in mathematical physics. According to the author, "Clifford algebra provides the key to a unified geometric calculus for expressing, developing, integrating and applying the large body of geometrical ideas running through mathematics and physics". The lecture is devoted to design comprehensive and efficient geometric calculus. The concepts of magnitude and directions are taken as basic and the concept of vector as the basic kind of directed number. They are defined implicitly by specifying the rules of adding and multiplying vectors, which are the basic rules of Clifford algebra. The geometric product is a combination of a symmetric (or inner) product and an antisymmetric (or outer) product. Next, these rules are used to construct the geometric function theory. This, in terms, leads to a suitable generalization of the definition of an analytic function in higher dimension. Finally as an application it is shown that this calculus provides a compact co-ordinate-free formulation for the basic equations of the classical relativistic electrodynamics.

Reviewer: N.D.Sengupta

MSC:

- [15A66](#) Clifford algebras, spinors
- [81V10](#) Electromagnetic interaction; quantum electrodynamics
- [83C50](#) Electromagnetic fields in general relativity and gravitational theory

Cited in **1** Review
Cited in **10** Documents

Keywords:

inner product; outer product; geometric calculus; Clifford algebra; geometric function theory; relativistic electrodynamics