JGSP **3** (2005) 105–107

JOURNAL OF
Geometry and Symmetry in Physics

BOOK REVIEW

Lectures on Clifford (Geometric) Algebras and Applications, by Rafal Ablamovicz and Garret Sobczyk (Eds), Birkhäuser, Boston 2004, xvii + 221 pp., 38.52 €, ISBN 0-8176-3257-3

The book under review contains the series of lectures on Clifford Geometric Algebras presented at the 6th International Conference on Clifford Algebras and their Applications in Mathematical Physics, held in May, 2002, at Tennessee Technological University in Cookeville, Tennessee.

Chapter 1 – Introduction to Clifford Algebras by Pertti Lounesto is devoted to the basic state of the author, namely "Clifford algebra is by definition the minimal construction designed to control the geometry in question". A concise, but coherent introduction to geometric algebras by thoroughly examining the Clifford product of two vectors, the definition of a bivector, and how these concepts are used to represent reflections and rotations in the plane and in higher dimensional spaces is given. The geometric significance of quaternions is explained first in three and then in four dimensions. It is shown how the more advanced concepts of spinors, exterior algebra and contraction, the Grassmann-Cayley algebra and shuffle product naturally evolve from the more basic concepts and also how the lower dimensional Clifford algebras can be represented in terms of the familiar algebra of square matrices. At the end several categorical definitions of Clifford algebras of a quadratic form are given, and their deformations to Clifford algebras of an arbitrary bilinear form.

In *Chapter 2 – Mathematical Structure of Clifford Algebras* – the author Ian Porteous claims that the "control of the geometry" which is a property of each Clifford algebra follows directly from the close relationship to the corresponding classical group. It is shown how the Clifford algebras can be constructed from matrix algebras over the real numbers, complex numbers, or quaternions with famous periodicity of eight. Useful tables of their most important features, such as tables of the spinor groups, groups of motion, conjugation types, the general linear groups, and the corresponding dimensions of the associated Lie algebras. A brief history