BOOK REVIEW

A Gyrovector Space Approach to Hyperbolic Geometry, by Abraham A. Ungar, Morgan & Claypool Publ., 2009, ix + 182 pp., ISBN: 978-1-59829-822-2, eBook, ISBN: 978-1-59829-823-9

1. Introduction

In the years 1908 – 1914, the period which experienced a dramatic flowering of creativity in the special theory of relativity, the Croatian physicist and mathematician Vladimir Varičak (1865 – 1942), professor and rector of Zagreb University, showed that this theory has a natural interpretation in the hyperbolic geometry of János Bolyai and Nikolai Ivanovich Lobachevsky [22]. However, much to his chagrin, Varičak had to admit in 1924 [23, p. 80] that the adaption of vector algebra for use in hyperbolic geometry was just not feasible. Fortunately, the author's studies of Einstein's velocity addition law of special relativity theory since 1988 [11] led him to discover the way of introducing into hyperbolic geometry both Cartesian coordinates and hyperbolic vector algebra. Hyperbolic vectors are called *gyrovectors* and their algebra is called gyroalgebra. The author's introduction of Cartesian coordinates and gyrovector gyroalgebra results in the *gyrovector space approach to hyperbolic geometry*, which is the title of the book under review, in a way fully analogous to the familiar vector space approach to Euclidean geometry. In order to elaborate a precise language for dealing with the resulting analytic hyperbolic geometry, which emphasizes analogies with classical notions, the author introduced the prefix "gyro", giving rise to *gyrolanguage*, the author's language of gyrogroups, gyrovector spaces and analytic hyperbolic geometry.

When I became familiar with the author's elegant work in analytic hyperbolic geometry several years ago, I invited him to publish some of his results in volumes that I have edited [12–14].