Review of: "The Change of Basis Groupoid"

Osman Mucuk[1]

1 Erciyes University

The paper gives an algebraic structure of change of basis matrices within a set of m bases of a finite vector space using category theory and therefore gives rise to a relation between the changes of bases of a finite dimensional vector spaces and groupoid.

Change of basis in a finite vector space has numerous significant and widespread applications in numerical computing, statistics, and engineering. These applica- tions include spectral methods for solving differential equations numerically, e.g., [3]; image, video, and data compression, e.g., [4] and implementing DCT-II in JPEG compression [5]; in Principal Component Analysis [6], and computer graph- ics [7].

A groupoid in categorical term is a small category in which each morphism is invertible.

In the paper following a background about the changes of bases in a finite dimensional vector space, in Theorem 1, a connected groupoid CB is obtained from the changes of bases of a vector space. The object set of CB is finite set of bases and the morphisms correspond to the changes of bases matrices between them. Subgroupoids within this structure correspond to upper and lower triangular matrices and matrices with alternating elements of 0.

The paper relate groupoids with the changes of bases for a finite dimensional vector space and therefore improves the applications of the groupoid theory. It looks interesting and it has numerical examples. It would be very useful for the people studying in this area. Hence I recommend the publication of the paper in Qeios academic publishing platform.