APPLICATIONS OF THE LOCAL ALGEBRAS OF VECTOR FIELDS TO THE MODELLING OF PHYSICAL PHENOMENA

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Abstract. In this paper we discuss the local algebras of linear vector fields that can be used in the mathematical modelling of physical space by building the dynamical flows of vector fields on eight-dimensional cylindrical or toroidal manifolds. It is shown that the topological features of the vector fields obey the Dirac equation when moving freely within the surface of a pseudo-sphere in the eight-dimensional pseudo-Euclidean space.

MSC: 57R25
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Contents

1. Introduction

The paper contains a collection of algebraic, geometric and dynamical facts concerning linear vector fields on simple locally affine manifolds ($\mathbb{R}^n$, cylinders, tori) where the main ingredient is the algebra defined by these vector fields with the product $X \star Y = \nabla_X Y$, where ∇ is the flat, torsionless connection of the locally affine structure of the manifold.