

عنوان مقاله:

Geometric analysis of the Lie algebra of Killing vector fields for a significant cosmological model of rotating fluids

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خلاصه مقاله:

The investigation of rotating fluids in the context of general relativity received remarkable consideration principally after Godel proposed relativistic model of a rotating dust universe. In this paper, a comprehensive analysis regarding the structure of the Lie algebra of Killing vector fields for a specific solution of field equations describing the behavior of rotating fluid models is presented. Killing vector fields can be undoubtedly reckoned as one of the most substantial types of symmetries and are denoted by the smooth vector fields which preserve the metric tensor. In this paper, we specifically concentrate on detailed investigation of the Killing vector fields by reexpressing the analyzed cosmological solution in the orthogonal frame. Significantly, for the resulted Lie algebra of Killing vector fields, the associated basis for the original Lie algebra is determined in which the Lie algebra will be appropriately decomposed into an internal direct sum of subalgebras, where each summand is indecomposable. Ultimately, the preliminary group classification of the symmetry algebra of the killing vector fields is presented. This noteworthy objective is thoroughly fulfilled via constructing the adjoint representation group, which generically insinuates a conjugate relation in the set of all one-dimensional subalgebras. Consequently, the corresponding set of invariant solutions can be reckoned canonically as the minimal list from which all the other invariant solutions of one-dimensional subalgebras are comprehensively designated unambiguously by virtue of transformations.

کلمات کلیدی:

Killing vector fields, Five Dimensional Spacetime, Rotating Fluids, Orthogonal Frame, Adjoint Representation

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