South East Asian J. of Mathematics and Mathematical Sciences
Vol. 16, No. 2 (2020), pp. 305-316

ISSN (Online): 2582-0850

ISSN (Print): 0972-7752

SPACE-TIME ADMITTING GENERALIZED CONFORMAL CURVATURE TENSOR

S. P. Maurya and R. N. Singh

Department of Mathematical Sciences,
A. P. S. University, Rewa - 486003, Madhya Pradesh, INDIA

E-mail : math.prakash7@gmail.com, rnsinghmp@rediffmail.com

(**Received:** *May 30, 2020* **Accepted:** *Jul. 22, 2020* **Published:** *Aug. 30, 2020)*

Abstract: The object of the present paper is to study space-time admitting generalized conformal curvature tensor.

Keywords and Phrases: Conformal curvature tensor; $\mathcal{Z}$-tensor; Generalized conformal curvature tensor; Einstein field equations; Perfect fluid space-time.

2010 Mathematics Subject Classification: Primary 53C25, 53C50; Secondary 53C80, 53B20.

1. Introduction

The aim of the present work is to study certain investigations in general theory of relativity and cosmology by the coordinate free method of differential geometry. The basic difference between Riemannian and semi-Riemannian geometry is (i) the existence of null vector (i.e. $g(v,v) = 0$, for $v \neq 0$, where g is the metric tensor) in semi-Riemannian manifold but not Riemannian manifold, (ii) the signature of metric tensor g in semi-Riemannian manifold is $(-,-,...-,+,+,...,+)$ but in a Riemannian manifold the signature of g is $(+,+,...,+)$. Lorentzian manifold is a spacial case of semi-Riemannian manifold. The signature of metric tensor g in Lorentzian manifold is $(-,+,+,...,+)$. A Lorentzian manifold consists of three types of vectors such as timelike (i.e. $g(v,v) < 0$), spacelike (i.e. $g(v,v) > 0$) and null vector (i.e. $g(v,v) = 0$, for $v \neq 0$). In general, a Lorentzian manifold (M,g) may not have a globally timelike vector field. If (M,g) admits a globally timelike vector field, it is called time orientable Lorentzian manifold, physically known