

BIANCHI V COSMOLOGICAL MODEL WITH STRANGE QUARK MATTER IN $f(R)$ GRAVITY

P. P. Khade and S. M. Warbhe*

Department of Mathematics,
Vidya Bharati Mahavidyalya, Maharashtra, INDIA

E-mail : mathsvbmvpk@gmail.com

*Department of Mathematics
Vidya Bharati Mahavidyalya,
Amravati - 444601, Maharashtra, INDIA

E-mail : mudeshital26@gmail.com

(Received: Oct. 13, 2024 Accepted: Dec. 18, 2024 Published: Dec. 30, 2024)

Abstract: In this research, we have studied behaviours of quark matter and strange quark matter which exist in $f(R)$ gravity in presence of Bianchi type universe. In order to obtain a deterministic solution, we have considered the scale factor which is a combination of two factors: the one is the usual power law expansion and the second one is an exponential function. We investigate exact $f(R)$ functions for Bianchi V as the contribution of strange quark and quark matter. Effect of the curvature function $f(R)$ is also observed on dynamical parameters. As per the observation both the pressure and density depend on $f(R)$ gravity and the bag constant. Hence both p_q and ρ_q remain positive. Then $\rho_{sq} \rightarrow \infty$ as $t \rightarrow 0$, and $\rho_{sq} \rightarrow 3Bc$ as $t \rightarrow \infty$. the statefinder parameters r, s converge to 1, 0 in the distant future and found that our model aligns with the Λ CDM model both at present and in the future. Finally we discussed our physical solutions.

Keywords and Phrases: $f(R)$ Gravity, Quark matter, Strange quark matter, Bianchi V space time.

2020 Mathematics Subject Classification: 83C05, 83C15, 85A40.