Vaidya Tikekar Type Anisotropic Fluid Star in *F (R, T)* Gravity

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ABSTRACT

In present work, a spherically symmetric, non-singular, charged anisotropic stellar object has been derived in context of $f(R,T)$ - gravity theory. The field equations are derived by considering $f(R,T) = R + 2\chi T$ and can be reduced to GR if $\chi_{=0}$ and the Lagrangian matter is considered to be $\mathcal{L}_m = \frac{-(p_r+2p_t)}{3}$. Hence obtained field equations have been solved by using Vaidya Tikekar potential [1] and MIT Bag model equation of state (EOS) in (3+1) - dimensional spherically symmetric space-time. The MIT Bag model is the simplest equation of state for determining the internal structure of the compact star model The model is matched with the Reissner-Nordstorm metric at the boundary to calculate the constants. The physical validity and stability of the model is investigated by some important physical properties such as effective pressure, density, energy density conditions, TOV equations and sound velocity for different values of χ. The compact relation and surface redshift are also discussed by highlighting the role of coupling constant χ . The cracking concept and relativistic adiabatic index have been tested for the stability of the solution. The compactness relation and surface gravitational redshift for $f(R,T)$ stellar model is discussed and it is observed that all obtained results lie within physically accepted regime which indicates the viability of the current solution for the strange star model in the context of $f(R,T)$ gravity theory which are verified by graphical representations of the model that provide strong evidences for the viability of the model.

Keywords: Modified gravity theory, Electric charge, Compact stars, Exact solution.

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