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Theoretical modelling of a new class of anisotropic compact stellar model compatible with observational data

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In this paper, a physically motivated form of one of the metric potential and a specific choice of the anisotropy has been utilized to obtain closed-form solutions of the Einstein field equation for a spherically symmetric anisotropic matter distribution. This class of solution has been used to develop viable models for observed pulsars. The exterior spacetime is assumed as described by the exterior Schwarzschild solution. The model parameters have been determined from the smooth matching of the interior to the exterior Schwarzschild spacetime metric and utilizing the condition that radial pressure is zero across the boundary. The physical acceptability of the developed model has been examined in detail by making use of the current estimated mass and radius of a known pulsar namely, 4U1820 − 30. The gross physical nature of the observed pulsar has been analyzed graphically. The stability of the model is also discussed given causality conditions, adiabatic index and under the forces acting on the system. To show that this model is compatible with observational data, few more pulsars have been considered, and all the requirements of a realistic star are highlighted. Also, the mass-radius (M − R) relationship of compact stellar objects analyzed.

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N/A

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