ABSTRACT ONLY

IMPACT OF THE MATCHING FORMALISM IN NEUTRON STARS AND THEIR OSCILLATION MODES

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The interior of neutron stars (NS) contains matter with densities several times higher than nuclear atomic density. Obtaining an accurate equation of state (EoS) to describe NS is crucial for enhancing our understanding of matter in such extreme environments. To achieve this, we built ten EoS by considering three diferent crusts which are added to the core of these compact objects using a new thermodynamically consistent formalism. Essentially, for an isolated and cold NS, we assume a linear relationship for pressure and energy density in a small region between the core and the crust. This establishes an interpolation function in the pressure/baryonic-chemical-potential plane. We compared this new way of "gluing" EoS with the classical method that neglects causal and thermodynamic consistency. Then, we solved the TOV equations, which describe a non-rotating, spherically symetric and static object, to obtain the mass-radius relationship and compared it with the existing observational constraints of NS. In addition, we explored changes that the new matching formalism can cause in the oscillation modes. With alternative matching formalisms, even for two or three interpolations of the same crust, the p_1 mode exhibited differences in oscillation frequencies and damping times for low-mass NS. In contrast, no visible effects can be appreciated for the f mode, neither in the three models of the crust nor in the interpolations considered. We conclude that independently of the model used for the EoS, the method of construction will impact in NS observables such as the radius, frequencies and damping times of non-radial oscillations.

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