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Neutron star radial oscillations with Delta Baryons

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Employing the density-dependent relativistic mean-field model, we investigate the effect of delta baryons on the radial oscillations of neutron and hyperon stars. A unified approach is employed to calculate the baryon-meson coupling constants for the spin-1/2 baryonic octet and the spin-3/2 decuplet. By solving the Sturm-Liouville boundary value problem and verifying its validity, we calculate the 20 lowest eigenfrequencies and related oscillation functions of delta-admixed nuclear (NΔ) and hyperonic matter (NHΔ).
We see that the presence of the delta and hyperonic admixtures causes the lowest mode frequencies for N+Δ and N+H EoSs to be higher than those for the pure nucleonic matter [1]. With the inclusion of hyperons and Δs, the distance between succeeding modes also increases.

References

1. Ishfaq A. Rather, K. D. Marquez, G. Panotopoulos, I. Lopes, arXiv preprint arXiv:2303.11006 (2023).

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