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R-mode frequencies for slowly rotating neutron stars with realistic equations of state ASHIKUZZAMAN IDRISY, BENJAMIN OWEN, Institute for Gravitation and the Cosmos, Center for Gravitational Wave Physics, Department of Physics, The Pennsylvania State University, DAVID JONES, Mathematical Sciences, University of Southampton — The frequency of r-mode oscillations of rotating neutron stars is of interest when carrying out gravitational wave and electromagnetic observations. The r-mode frequency in the slow rotation limit of Newtonian stars is well known, but will be subject to various corrections. We make simple estimates of the importance of several sorts of correction, and conclude that relativistic corrections are likely to be the most important. For this reason we extend the formalism of Lockitch et al. [1], who consider relativistic polytropes, to the case of realistic equations of state. The perturbation equations resulting from this formulation are solved using a spectral method. We find that for stars with realistic equations of state, the r-mode frequency ranges from 1.39Ω to 1.56Ω (where Ω is the rotation rate of the star), when the relativistic compactness parameter M/R is varied over the astrophysically-motivated interval from 0.11 to 0.31. The results presented here are relevant to the design of gravitational wave and electromagnetic r-mode searches, and will help in constraining the compactness parameter following a successful r-mode detection, which is itself related to the high density equation of state.

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