The stability properties of differentially rotating neutron stars and strange stars

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Differentially rotating neutron stars (or strange stars) are believed to be produced in binary neutron stars mergers or in the collapse of a massive stellar core. A natural question of stability of those objects arises, which can be answered by numerical simulations. Following the evolution of those objects in time can be, however, numerically challenging and time-consuming. Alternatively, the equilibrium models can be used as computationally inexpensive tool for the parameter space exploration. We employ highly accurate and stable relativistic FlatStar code to calculate sequences of differentially rotating equilibrium models using the j-constant law for all four types of solutions and broad ranges of the degree of differential rotation. We verify if the "quasi-universal" relations for turning points for fixed rest mass or angular momentum can be used for differentially rotating neutron stars and strange quark stars. I will present the advantages of the spectral FlatStar code and compare our results with previous work on that topic.