Turning point principles for the stability of stellar models.

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Abstract

I will discuss some recent results (with Chongchun Zeng) on the linear stability criterion for non-rotating stars modeled by the Euler-Poisson system. Under general assumption on the equation of states, we prove a turning point principle that the stability of the stars is is entirely determined by the mass-radius curve parametrized by the center density. In particular, the stability can only changed at points with an extremal mass. We use a combination of first order and 2nd order Hamiltonian formulations to get the stability criterion and the semi-group estimates for the linearized equation. If time permits, I will briefly describe the extension of this approach to study stability of rotating stars (with Yucong Wang), and relativistic stars and star clusters (with Hadžić and Rein).