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Post-Newtonian diagnostics for initial data

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Using a post-Newtonian diagnostic tool developed by Mora and Will, we examine numerically generated quasiequilibrium initial data sets used in numerical evolutions of black hole-black hole, neutron star-neutron star and neutron star-black hole binary systems. The post-Newtonian equations include the effects of tidal interactions, parametrized by the compactness of the neutron stars and by suitable values of "apsidal" constants, which measure the degree of distortion of stars subjected to tidal forces. We find that the post-Newtonian diagnostic agrees well with black hole-black hole and neutron star-neutron star initial data, except where tidal distortions are becoming extreme. In comparing the diagnostic with preliminary numerical data on neutron star-black hole binaries, we find less agreement. We show that the differences could be interpreted as representing small residual eccentricity in the initial orbits.