STUDY OF THE NONLINEAR MODE-TIDE COUPLING OF COALESCING BINARY NEUTRON STARS IN RELATIVISTIC FORMALISM

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Recently a new hydro instability has been introduced as a result of the nonlinear coupling of the neutron star's tidal fields to pairs of p-mode and g-mode of its companion neutron star in a binary system (PG instability). This instability is important, because it could influence the inspiral phase of the NSNS mergers by extracting orbital energy, which leaves an observable imprint on the gravitational wave signal. So far, all the p-g instability studies have been formulated in the Newtonian perturbation theory. Because of its potential importance, the details of the instability should be further investigated, especially it is necessary to include the relativistic equations, and study their effects on the instability's criterion, growth rate and saturation. To achieve this goal partially, we have developed a numerical code to derive the relativistic eigenmodes of the stellar oscillations for TOV stars. We use these eigenmodes in addition to the other relativistic components to compute the mode-tide coupling strength for different equations of state. We compare our results with the previous works, and discuss how important the relativistic effects are to study the mode-tide couplings.