
Recombination energy in common envelope phases

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Abstract

The common envelope (CE) phase is important for the evolution of close binary systems with compact stars. In the past, most 3D hydrodynamic simulations of the CE phase have failed to explain how the envelope is ejected. For a long time, it has been discussed if energy from recombination of H and He may help ejecting the envelope. Here, I present 3D hydrodynamic simulations of the CE phase of a two solar mass red giant with different companions including the release of recombination energy. I will show that releasing recombination energy helps ejecting the envelope: after the rapid spiral-in releases orbital energy and lifts large parts of the envelope to larger radii, recombination energy is released during expansion, largely unbinding the envelope during the simulated time. Moreover, I will show that convergence can be achieved in this type of simulations by increasing the resolution around the red giant core and the companion. I will also present first light curves computed from the simulations and compare the luminosities and colors to observations of luminous red novae and to analytical models.

Keywords: common envelope, recombination, light curves

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