Abstract

Binary mass transfer is a common phenomenon is stellar astrophysics. If the mass transfer proceeds on dynamical timescale, the binary can undergo a catastrophic interaction accompanied by tremendous loss of mass, angular momentum, and energy. This so-called common envelope evolution phase is a crucial step in the formation of close binaries composed of compact objects (white dwarfs, neutron stars, black holes), which includes progenitors of gravitational wave sources detected by LIGO. By improving existing models of binary mass transfer we can correct the predictions of common envelope evolution and constraint the rates of close binaries composed of compact objects. In this work, we introduce new model of binary mass transfer. We will treat the mass transfer as a special case of stellar wind. We will rely on the assumption that the Roche potential sets up a de Laval nozzle around the first Lagrange point. The mass is then transferred through the nozzle. Our binary mass transfer model predicts mass transfer rates in the same order of magnitude as the standard models which use the Bernoulli's law. But the advantage of our model is that it is extendable to account for radiation.