



# Simulating the Common Envelope Phase of a Red Giant Using SPH and Uniform Grid Codes

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We use three-dimensional hydrodynamical simulations to study the rapid infall phase of the common envelope interaction of a red giant branch star of mass equal to  $0.88 M_{\odot}$  and a companion star of mass ranging from  $0.9 M_{\odot}$  down to  $0.1 M_{\odot}$ . We first compare the results obtained using two different numerical techniques with different resolutions, and find overall very good agreement. We then compare the outcomes of those simulations with observed systems thought to have gone through a common envelope. The simulations fail to reproduce those systems in the sense that most of the envelope of the donor remains bound at the end of the simulations and the final orbital separations between the donor's remnant and the companion, ranging from  $26.8 R_{\odot}$  down to  $5.9 R_{\odot}$ , are larger than the ones observed. We suggest that this discrepancy vouches for recombination playing an essential role in the ejection of the envelope and/or significant shrinkage of the orbit happening in the subsequent phase.

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