Accretion Simulations of Eta Carinae and the Parameters of the Binary System

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Abstract

We present high resolution numerical simulations of the colliding wind system Eta Carinae, showing accretion onto the secondary star close to periastron passage. The smooth stellar winds collide and develop instabilities, mainly the non-linear thin shell instability, and form filaments and clumps. We find that a few days before periastron passage the dense filaments and clumps flow towards the secondary as a result of its gravitational attraction, and reach the zone where we inject the secondary wind. We run our simulations for the conventional stellar masses, M1=120 Msun and M2=30 Msun, and for a high mass model, M1=170 Msun and M2=80 Msun, that was proposed to better fit the history of giant eruptions in the nineteenth century. As expected, the simulations results show that the accretion processes is more pronounced for a more massive secondary star. We obtain orbital parameters of the binary system from the simulation results, and learn about the recovery of Eta Carinae from its giant eruptions.

Keywords: LBV, winds, accretion

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