Highlights of Spanish Astrophysics VIII, Proceedings of the XI Scientific Meeting of the Spanish Astronomical Society held on September 8–12, 2014, in Teruel, Spain. A. J. Cenarro, F. Figueras, C. Hernández-Monteagudo, J. Trujillo Bueno, and L. Valdivielso (eds.)

Wind accretion and formation of disk structures in symbiotic binary systems

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Abstract

We investigate gravitationally focused wind accretion in binary systems consisting of an evolved star with a gaseous envelope and a compact accreting companion. We study the mass accretion and formation of an accretion disk around the secondary caused by the strong wind from the primary late-type component using global 2D and 3D hydrodynamic numerical simulations. In particular, the dependence of the mass accretion rate on the mass loss rate, wind temperature and orbital parameters of the system is considered. For a typical slow and massive wind from an evolved star the mass transfer through a focused wind results in rapid infall onto the secondary. A stream flow is created between the stars with accretion rates of a 2–10% percent of the mass loss from the primary. This mechanism could be an important method for explaining periodic modulations in the accretion rates for a broad range of interacting binary systems and fueling of a large population of X-ray binary systems. We test the plausibility of these accretion flows indicated by the simulations by comparing with observations of the symbiotic variable system CH Cyg.