NUMERICAL STUDY OF THE SHAPING OF PLANETARY NEBULAE

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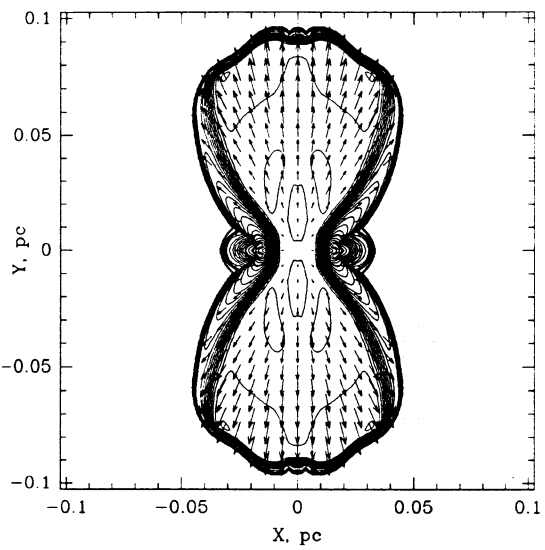
An axisymmetric density distribution likely to be representative for many Planetary Nebulae (PN). We suggest that the axial symmetry of PN results from a predominant ejection of matter in the equatorial direction due to the duplicity of the central star (Livio *et al.*,1979, Ap.J.,**188**,1). We present an illustrative example of the formation of the bipolar PN Soutern Crab (He 2-104). In this model high velocity matter ejected by hot central star interacts with an outer oblate envelope located around a symbiotic binary star. The binary consists of a Mira variable, ejected matter forming a thick disk, and a hot component (Lutz *et al.*,1989, PASP 101,966). Accretion of some disk matter onto the hot component (dwarf) may lead to recurrent thermal shell flashes (Igumenshchev *et al.*,1990, Astrofizika,**30**,282). which result in the double shell nebula, observed in the Southern Crab (Burgarella *et al.*, 1991,A&A,**249**,199). The phase of forming a single shell s-tucture of the Southern Crab was simulated numerically. The results of a 2D hydrodynamical nonadiabatic calculation are illustrated in the Figure. The density contours with logarithmic spacing of 0.25 and the velocity field (arrows) of the model are shown at time $t \simeq 360\ yrs$ after the central star outburst with energy $10^{44}\ erg$. The dense shell may be observed as a Crab-like nebula ("hour-glass" type). In this model the mass of the envelope is $7 \cdot 10^{-4} M_{\odot}$ and the maximal velocity is over of $200\ km/s$.



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