CONTRACTING ENVELOPES OF NOVAE AFTER OUTBURSTS

(Abstract)

KYOJI NARIAI

Tokyo Astronomical Observatory, University of Tokyo, Mitaka, Tokyo, Japan

The idea that hydrogen-rich material from one component of a binary falling on to the surface of another component which is a white dwarf causes the nova phenomenon is now currently accepted. The present work is based on this idea, but we study the evolution of the extended envelope which contracts slowly some time after the nuclear event. Of course, there is an expanding envelope outside the contracting envelope.

The luminosity of the contracting envelope is almost constant while the effective temperature rises from about 10^4 K to 10^5 K as the radius decreases until time $\tau_0/2$, where

$$\tau_0 = \frac{\varkappa M_{\text{env}}}{4\pi c R_{\text{core}}} = 300\left(\frac{M_{\text{env}}}{10^{-4}\, M_\odot}\right)\left(\frac{0.01\, R_\odot}{R_{\text{core}}}\right) \text{days}.$$

Subsequently both the effective temperature and the luminosity decrease. References and more discussion can be found in Nariai (1974).

In constructing models, we assume the functional form of the luminosity distribution and its derivative instead of using the equation for the conservation of energy. This makes the calculation fairly simple because we have ordinary differential equations instead of partial differential equations. Selfconsistent solutions are found by a trial and error method. Details of the method of calculation will be published in Nariai (1973).

References

Nariai, K.: 1973, *Ann. Tokyo Astron. Obs., Ser. II* **XIV**, 1.
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