THE EFFECT OF A CLOSE BINARY COMPANION ON A NOVA OUTBURST

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We compare two hydrodynamic calculations of thermonuclear runaways in material accreted by a $1M_\odot$ white dwarf of initial luminosity $10^{-3}L_\odot$. In both cases the CNO abundances are taken to be near solar ($Z_{CNO} = 0.014$). The only difference between the calculations is that in one sequence of models (seq.B) the additional energy generation due to the interaction between the expanding nova envelope and a close red dwarf companion is allowed for, using a simple model based on that of Paczynski (1976).

In the absence of binary interaction (seq.A), the envelope expands over a period of about 40 days, to the size of a red supergiant. The maximum photospheric velocity attained is 40 km/s and is less than escape velocity. We tentatively identify this model with the very slow novae.

In seq.B, the binary interaction speeds up the outburst to the extent that supergiant dimensions are reached after about 4 days. The maximum photospheric velocity is about 300 km/s, which is greater than escape velocity. We identify this model with the slow novae.

In both sequences the maximum visual luminosity is about $2\ 10^4 L_\odot$.

REFERENCE

Paczynski, B. 1976, in I.A.U. Symposium No. 73, p. 75, ed. by Eggleton, Mitton and Whelan.

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