1-CLASSICAL NOVAE

Classical novae (CN) are thermonuclear explosions that occur in binary systems where a white dwarf (WD) accretes H-rich material from its stellar companion. This material piles up on top of the WD until the temperature is high enough for a thermonuclear runaway (TNR) to take place, which leads to the ejection of the accreted envelope into the interstellar medium. CN do not disrupt the whole WD (as type Ia supernovae do) and the phenomenon can recur many times.

In this work, we performed multiple nova outbursts and check whether their physical properties depend on the burst number and the previous explosions.

2-MESA

Modules for Experiments in Stellar Astrophysics (MESA) (Paxton et al. 2011) is an open source, robust, efficient and thread-safe library of Fortran modules with applications in a wide range of stellar astrophysics. Its main module star can simulate different stages in the evolution of stars (e.g., H-burning in main sequence stars, the evolution through the asymptotic giant branch, supernova explosions or WD cooling).

3-METHODOLOGY

Classical nova outbursts have been simulated with MESA using different input parameters: MESA simulations have been performed to study classical novae using different input parameters.

- Nuclear reaction networks: different networks have been considered, ranging from 24 isotopes and 75 nuclear interactions to 99 isotopes and 999 reactions.
- Different mass loss schemes (e.g., Super Eddington Wind and Roche Lobe Overflow) have been considered.
- Mixing between the accreted material and the outer WD layers has been modeled by means of convective overshooting (Denissenkov et al. 2012).

ACKNOWLEDGEMENTS

We are grateful to two members of the Arizona State University: Dr. Robert Farmer, for his understanding and help with mesAPlot and other Python analyzing and plotting tools, and Prof. Frank Timmes, for his support on our Vimscript codes, now shared with all the other MESA Add-Ons.

REFERENCES

