W25a Numerical Modeling of Clocked Burster GS1826-24 with the physics inside neutron stars

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Type-I X-ray burst, which is the thermonuclear reaction induced by unstable H/He burning, has been observed and 112 bursters have been discovered so far (int'Zand et al. 2019). In a number of these bursters, GS1826-24 is one of the most characteristic bursters because the light curves of this burster have been known to be unchanged during an epoch and imply the constant accretion rate. For that reason, this burster is convenient for numerical modeling of X-ray burst and that's why this burster is often called *clocked burster*.

Several work to try to fit the model of GS1826-24 has been performed (e.g. Heger et al. 2007, Meisel 2018). Although they incorporate the large reaction network with around 1000 nuclei, they calculate the light curves for only accretion layer. To consider the physics of neutron-star core such as the equation of states and neutrino emissions, whole regions of neutron stars should be covered in burst calculations. In this work, using the general evolutionary code (Fujimoto et al. 1984), we perform the numerical simulations of X-ray burst with equation of states and slow cooling processes. Moreover, to reduce the numerical cost, we construct the approximate reaction network with 88 nuclei (Matsuo 2018 and Yamada 2019) and incorporate it. Finally, compared with the observed light curve and the recurrence time of GS1826-24, we can construct the best-fit model with the initial metalicity $Z = 0.01$.