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学 位 論 文 題 名	X-ray study of the boundary layer of dwarf novae in optical quiescent state 可視光静穏時における矮新星の境界層の X 線観測による研究（英文）
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【論文の内容の要旨】

This study aims to elucidate physical state of the boundary layer by systematically analyzing X-ray data of dwarf novae in the optical quiescent states.
The dwarf nova is a semi-detached binary system consisting of the non-magnetic white dwarf and a late-type main-sequence star (secondary). Around the white dwarf is formed an accretion disk composed of the gas transferred from the secondary. When thermal instability occurs in the disk, the gas accretes rapidly to the white dwarf and an optical outburst occurs. If the white dwarf rotates much more slowly than the Keplerian velocity on its surface, the accreting matter is heated by high friction between the inner accretion disk and the white dwarf surface. This region is referred to as the boundary layer and emits X-rays. We analyzed the X-ray spectra of 19 dwarf novae in the optical quiescent state observed by the *XMM-Newton* satellite. The X-ray spectra of quiescent dwarf nova are moderately well represented by the multi-temperature thermal plasma emission model. We evaluated the spectra by adding the reflection component of the plasma from the disk and white dwarf surface and a 6.4 keV fluorescent iron emission line to this model. As a result, we discovered a clear correlation between the mass accretion rate through the boundary layer and the orbital period. The boundary layer mass accretion rate was found smaller than that in the accretion disk roughly by an

order of magnitude. We also discovered a clear correlation between the maximum temperature of the plasma and the white dwarf mass. The maximum temperature is about 60 % of that expected from the radial flow strong shock on the white dwarf surface.

To understand the time evolution of the boundary layer X-ray emission mechanism in the optically quiescent phase, we used data from the SU UMa-type dwarf nova VW Hyi observed by the X-ray astronomy satellites *XMM-Newton* and *Suzaku*. The SU UMa-type dwarf nova shows not only the normal outburst but also a super-outburst, which is brighter in the optical band than the normal outburst by $\sim$1 mag at its peak, and lasts about 5 times longer than the normal outburst. We evaluated the behavior of the boundary layer in terms of the number of days elapsed since the last super-outburst or the last outburst. As a result, although there was no clear trend as a function of time since the last super-outburst, the mass accretion rate showed a clear declining trend with time since the last outburst. The rate of decline is about -2.2 % d^{-1}. A similar analysis on SS Cyg observed by *XMM-Newton*, *Suzaku,* and *NICER* results in a similar declining rate of the mass accretion rate of -2.6 to -1.2 % d^{-1}. A number of numerical simulations of on the dwarf nova outburst predict that the accretion rate to the white dwarf during quiescence will increase with the growth of the disk. However, our observations show that mass accretion to the white dwarf decreases over time while the accretion disk accumulates gas to the outburst. We need further observation and theoretical consideration to resolve this discrepancy.