Modeling of the spectral energy distribution of cataclysmic variable TT Ari and evaluation of the system parameters

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The spectral energy distribution (SED) of the TT Ari system, which is well known from published IUE and optical photometric observations, was modeled by a steady state accretion α-disc around a white dwarf. Parameters of the system were derived from time-resolved optical spectral observations in the bright state that we obtained in Sep. 1998. The radial velocity semi-amplitude of the white dwarf (33.8 $\pm$ 2.5 km s$^-$1) and corresponding mass function ($f(M) = 5.5 \pm 1.2 \times 10^{-4}\ M_\odot$) were derived from the motion of the emission components of Balmer lines. The mass ratio q (≈ 0.315) was evaluated from the fractional period excess of the superhump period over the orbital period ε (≈ 0.085), and a secondary mass range ($0.18 - 0.38 M_\odot$) was estimated from the orbital period. Therefore, the white dwarf mass range is $0.57 - 1.2 M_\odot$ and the inclination angle of the system to the line of sight is 17 - 22.5 degrees. The adopted distance to the system is 335 $\pm$ 50 pc. To fit the observed SED it is necessary to add a thermal spectrum with $T \approx 11600$ K and luminosity $\approx 0.4 L_\mathrm{d}$ to the accretion disc spectrum. This combined spectrum successfully describes the observed Balmer lines absorption components. Formally the best fit of the HeI 4471 line reaches at minimum masses of the components ($M_\mathrm{RD} = 0.18\ M_\odot$ and $M_\mathrm{WD} = 0.57\ M_\odot$), with the corresponding inclination angle $i = 22.^\circ1$ and the mass-accretion rate $\dot{M} = 2.6 \times 10^{17}$ g s^{-1}.