Mass Transfer and Accretor Cooling in AM CVn binaries

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AM CVn binaries are ultracompact with $P_{\rm orb} \approx 5 - 70$ minutes undergoing helium mass transfer. I will describe results using MESA to model the mass transfer from an initially $< 0.2\,M_\odot$ He WD onto an initially $> 0.6\,M_\odot$ CO WD. In agreement with previous works, the initially high mass transfer rate forces an adiabatic evolution of the donor for $P_{\rm orb} < 30$ minutes, such that its mass-radius relation (and hence mass-orbital period relation) depends primarily on its initial entropy. At later times, entropy loss occurs, but at an uncertain rate due to unreliable cool helium opacities. The thermal evolution of the accretor, however, is more certain. The CO WD is reheated at early times due to the very rapid accretion and then evolves, as the accretion rate declines, to a cooling phase at $P_{\rm orb} > 30$ minutes. Given a relation between orbital period and cooling time of the accretor, assuming adiabatic evolution of the donor, we find that the observed accretors at long orbital periods are not as cool as expected. The discrepancy widens if entropy loss of the donor is allowed. We speculate this cooling delay may have the same physical origin of a similar delay seen in massive WDs in the field.