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The intermediate-age pre-cataclysmic variables SDSS J172406+562003 and RE J2013+4002

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Abstract

We have analyzed the physical status of the pre-cataclysmic variables SDSSJ172406+562003 and RE J2013+4002, which have evolved after their common-envelope stage a time $t = 10^6$ - 10^7 years. Spectroscopy and photometry of these systems were performed with the 6-m and 1-m telescopes of the Special Astrophysical Observatory. We demonstrate that emission lines in the spectra were formed solely by the reflection of radiation emitted by the white dwarfs on the surfaces of their cool companions, under conditions close to local thermodynamic equilibrium. These effects are also responsible for most of the objects' photometric variability amplitude. However, comparing the light curves of SDSS 172406 from different epochs, we find aperiodic brightness variations, probably due to spottedness of the surface of the secondary. Jointly analyzing the spectra, radial-velocity curves, and light curves of the pre-cataclysmic variables and modeling the reflection effects, we have derived their fundamental parameters. We demonstrate that the secondaries in these systems are consistent with evolutionary models for main-sequence stars and do not have the luminosity excesses characteristic of cool stars in young pre-cataclysmic variables. © 2012 Pleiades Publishing, Ltd.

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