Physical and dynamical parameters of the multiple system HD 222326

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Abstract

We present the results of our study of the physical and dynamical parameters of the multiple system HD 222326. A new method for determining the individual radial velocities of components in wide binary and multiple systems in the case of small radial-velocity differences (δV r the FWHMfor the line profiles) is suggested and tested for both model systems and the binary HD 10009. This testing yielded the component radial velocities V r 1,2 for HD 10009, enabling us to derive the center-of mass velocity, V γ, for the first time. We determined the radial velocities of the components of HD 222326 from high-resolution spectra, and refined the orbital parameters of the subsystems using speckle-interferometric observations. A combined spectroscopic and speckle interferometric analysis enabled us to find the positions of the components in the spectral type-luminosity diagram and to estimate their masses. It is likely that the components are all in various evolutionary stages after leaving the main sequence. We analyzed the dynamical evolution of the system using numerical modeling in the gravitational three-body problem and the known stability criteria for triple systems. The system is probably stable on time scales of at least 106 years. The presence of a fourth component in the system is also suggested. © 2008 Pleiades Publishing, Ltd.