Absolute dimensions and evolutionary status of the semi-detached Algol W Ursae Minoris

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Double-lined eclipsing binaries allow accurate and direct determination of fundamental parameters such as mass and radius for each component, and they provide important constraints on the stellar structure and evolution models. In this study, we aim to determine a unique set of binary parameters for the semi-detached system W UMi and to examine its evolutionary status. New high-resolution time-series spectroscopic observations were carried out during 14 nights from 2008 April to 2011 March, and a total of 38 spectra were obtained using the Bohyunsan Optical Echelle Spectrograph. Double-lined spectral features from the hot primary and cool secondary components were well identified. We determined the effective temperatures of the primary star to be $T_{\rm eff,1}$ = 9,750 ± 250 K by comparing the observed spectra and the Kurucz models. Physical parameters of each component were derived by analyzing our radial velocity data together with the previously published *byUBV* light curves. The masses and radii of both components were determined to be M_1 = 3.81 M□, M_2 = 1.49 M□ and R_1 = 3.89 R□, and R_2 = 3.14 R□, respectively. A comparison of these parameters with the theoretical evolution tracks showed that the primary component lies in the main-sequence band, while the low-mass secondary is noticeably evolved. The result indicates that the initially more massive star becomes the present secondary by losing most of its own mass via mass transfer to the companion (present primary) and stellar wind.