[구ST-07] Internal Structure and Apsidal Motions of Polytropic Stars in Close Binary Systems

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Close binary stars are a traditional source of information about mass-luminosity and mass-radius relationships aswell as the degree of central mass condensation via observations of apsidal motions. Yet, the existing theoretical models of close binary stars are only approximate. In this work, we use a self-consistent field method to construct models for the shapes, internalstructure, and apsidal motions of close binary stars in circular synchronous orbits, assuming that a primary component obeysa polytropic equation of state, while treating a secondary component as a point mass. The dependencies of internal structure on the rotational and tidal parameters show that well-studied rotational distortion can be considered as a particular case of a more general both tidal and rotational distortions. The apsidal motion rates calculated for cases of circular orbits under the equilibrium tide condition turn out to be smaller, by about as large as a factor of 2, than the predictions of the classical formula based on the 1st-order perturbation theory, partially reducing the discrepancy between observed and theoretical values of apsidal motions. For practical uses, we provide various fitting formulae for internal structure and apsidal motions.

[구ST-08] ABSOLUTE DIMENSIONS OF TEN INTERMEDIATE MASS MAIN SEQUENCE ECLIPSING BINARIES

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We presented the accurate absolute dimensions and distances of ten main sequence eclipsing binaries. We found photometric and spectroscopic solutions by analyzing light curves and radial velocity curves collected from the literature using the Wilson-Devinney computer code which simultaneously. Ten double-line spectroscopic binaries consist of six detached systems; DM Vir, BS Dra, VZ Hya, BW Aqr, MY Cyg, and EE Peg, one semi-detached systems; DI Peg, one near contact system; EE Aqr, and two contact systems; RR Cen and V1073 Cyg. The systems' temperature were determined by color-temperature calibrations. We resolved each component's temperature from the binary system temperature by using a relation between temperature ratio and radii ratio. We estimated the possible Z values and ages for detached systems by applying the Y2 (Yonsei-Yale) stellar evolutionary tracks. Six detached systems'still have their components in the main-sequence. Our derived masses are in good agreement with that provided from the theoretical tracks within 0.1Msunerror. The derived distances have propagation error within 10% and are in good agreement of Hipparcos distances whose error of parallax are within 10 %. Finally these well-investigated systems will be used as the standard eclipsing binaries where their parameter set will be the reasonable initial values for the extragalactic systems which have the similar light curves.