RESULTS OF A COOPERATIVE INVESTIGATION OF RY SCUTI

M.I. Kumsiashvili
Abastumani Astrophysical Observatory
Georgian Academy of Sciences
U.S.S.R.

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Some preliminary results are given of a cooperative investigation of the highly interesting radio object RY Sct. From spectroscopic data the mass-ratio was found to be $q=m_2/m_1 \approx 3.3$. An attempt to determine the helium content by model-atmosphere techniques has shown that the atmosphere of the primary component has a large helium excess; the star has every characteristic of a helium star formed by mass exchange in case B. The analysis suggests that RY Sct may offer a rare chance to observe a massive system at the stage when "switching of the roles" is complete and a helium remnant with a hydrogen shell is beginning to develop the characteristics of a WR-star.

Two different models were used to analyze the photometric data: the Roche model and a system with a geometrically thick disk around the secondary component. The disk model represents the observations of RY Sct, including the primary minimum, rather well. In the model, the shape of the primary component coincides with the equipotential surface of the Roche model, while the surface of the secondary, disk-like, component is approximated by a flattened spheroid with its equator in the orbital plane. The solution obtained corresponds to a hot (B0) primary, filing its Roche lobe and losing mass to the secondary, which is surrounded by a disk envelope. The disk has a large radius and is very flattened ($\underline{b}/\underline{a}=0.21$); its mean temperature, ~26,000K, is less than the effective temperature of the primary. Most of the bolometric flux of the disk radiates from its hot polar regions (~40,000K) but, as the orbital inclination is close to 90°, we can see only the relatively cool equatorial regions (~20,000K).

From the parameters of this thick-disk model, one can conclude that the features of RY Sct resemble very closely those of a binary WR+OB system in which the less-massive star is supposed to have completed the initial mass-transfer, to have bared its helium-rich core and to be about to change into a WR star. The system is unique, being in a transient stage of its evolution, and important for understanding stellar physics.

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