The 2.35 year itch of Cyg OB2#9. II. Radio monitoring

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Cyg OB2 #9 is one of a small set of non-thermal radio emitting massive O-star binaries. The non-thermal radiation is due to synchrotron emission in the colliding-wind region. Cyg OB2 #9 was only recently discovered to be a binary system and a multi-wavelength campaign was organized to study its 2011 periastron passage. We report here on the results of the radio observations obtained in this monitoring campaign. We used the Expanded Very Large Array (EVLA) radio interferometer to obtain 6 and 20 cm continuum fluxes. The observed radio light curve shows a steep drop in flux sometime before periastron. The fluxes drop to a level that is comparable to the expected free-free emission from the stellar winds, suggesting that the non-thermal emitting region is completely hidden at that time. After periastron passage, the fluxes slowly increase. We introduce a simple model to solve the radiative transfer in the stellar winds and the colliding-wind region, and thus determine the expected behaviour of the radio light curve. From the asymmetry of the light curve, we show that the primary has the stronger wind. This is somewhat unexpected if we use the astrophysical parameters based on theoretical calibrations. But it becomes entirely feasible if we take into account that a given spectral type - luminosity class combination covers a range of astrophysical parameters. The colliding-wind region also contributes to the free-free emission, which can help to explain the high values of the spectral index seen after periastron passage. Combining our data with older Very Large Array (VLA) data allows us to derive a period P = 860.0 +- 3.7 days for this system. With this period, we update the orbital parameters that were derived in the first paper of this series.

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