RESULTS OF THE PROMINENCE OBSERVATIONS AT MICROWAVES DURING THE MAXIMAL PHASE OF THE TOTAL SOLAR ECLIPSE OF MARCH 2006

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Results of the prominence radio emission study according to observations of the solar eclipse on 2006 March 29 with the Northern sector and with the Southern sector with the Flat mirror of RATAN-600 are discussed. Investigation of the prominence located in the NE solar limb is executed in the (1.03-5.0) cm wavelength range. These observations are unique because the solar eclipse was observed with one telescope simultaneously by two different methods. This enables to supplement mutually the data received by observations with two different sectors and gives an opportunity to control some obtained results. The angular resolution of the antenna in the horizontal direction is from 17.5 arcsec up to 47 arcsec in the (1.88-5.0) cm wavelength range with the Southern sector and the Flat mirror and from 0.44 arcmin to 1.68 arcmin in the (1.03-3.9) cm range with the Northern sector of the RATAN-600. An average angular size of the prominence source in the specified wavelength range is about 30 arcsec. From observations with the Northern and Southern sectors, the position of maximum of the prominence radio source have been found to coincide with the prominence top of the solar image in the He II 304 line (SOHO, ϕ=45^o, NE limb of the Sun). The radio fluxes of the prominence were obtained in the wavelength range from 1.03 to 5.0 cm. The fluxes in the range λ = 1.38 - 4.0(cm) are equal to F(λ)=0.8-0.01(s.f.u.). These values coincide for observations with both sectors of RATAN-600, meanwhile the methods of the observations and the techniques of data processing of the observations with two sectors were different.

The obtained spectrum of the prominence defined a thermal mechanism of the prominence radio emission in the (1.03-5.0) cm range. There is a sharp decrease of the prominence radio flux down to value F = 0.02 s.f.u. in comparison with expected value for the 1.03 cm wavelength, according to received dependence F (λ). Possibly it is caused by the Moon closing the prominence at the moment of observation. A relative position of the Moon and the Sun at the moment of the solar eclipse maximum phase allowed to estimate the height of the prominence above the photosphere. The derived brightness temperatures of the prominence are equal to $T_b = (5450 - 17900)^o$ K in the (1.84-4.21) cm wavelength range. It was registered a bipolar structure of the radio source associated with the prominence. The degree of circular polarization of the source is: $p = (5 - 10)\%$ for the (1.84-5.0) cm wavelengths.

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