The structure of solar millimetre emission sources derived from eclipse observations

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The principal aim of solar eclipse radio observations is to obtain high-resolution brightness distribution of sources on the solar disc and the limb. This information can be derived from an eclipse curve, i.e. from records of the solar signal as the solar disc is covered and uncovered by the moon disc. At short millimetre wavelengths serious difficulties exist: the strong influence of terrestrial atmosphere absorption and its fluctuations as well as the low contrast of solar sources. In order to reduce significancy these obstacles a special small expedition millimetre radio telescope has been designed at Baumann Moscow State Technical University. In this radio telescope a conic scanning by the antenna beam around the solar disc center is used. Thus the quiet sun signal modulated by fluctuations of the atmospheric attenuation is cancel out in the output signal and the noise due to fluctuations of the atmospheric absorption is suppresseed and the sensitivity to the eclipse signal is improved.

Several total solar eclipses were observsd with this radio telescope at 3.4 mm wavelength. In this spectral range the active region emission is due only to bremsstrahlung and it is important to reveal a fine structure of AR emission (the sunspot and the plage components) and to know whether there is any difference between emission of these components. For some sources in several eclipse observations a fine structure of active region sources was not found out with spatial resolution of 5-10 arcsec, so the sunspot-associated sources have brightness temperatures less than 20% above the plage (the entire AR).