Radiation-temperature dependence of water on microwaves

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**Abstract**. Pure water radiation-temperature dependence at wavelength 8 mm in the temperature range of 30-50 *ОC* has been experimentally investigated. Measurements were made with the microwave radiometer with central frequency 37.5 GHz (wavelength 8 mm). The absolute method of measuring the intensities of distributed radiation was used. A horn with a 30x30 mm opening was used as an antenna. In the wave zone of the horn, at a distance of 250 mm, radiating bodies were installed, completely overlapping the directional pattern of the horn. Calibration of the intensity of the received radiation was carried out by its own radiation of a black body at different temperatures. The equipment had a sensitivity (fluctuation threshold) 0.2 K at a time constant τ = 1 sec. During measurements, the signal was recorded in relation to the temperature of the calibration standard, the duration of recording the signal was 1 minute. An increment of the radio-brightness contrast is about 3 K in this temperature range. The water radio-emission depends non-linearly on the kinetic temperature. It was measured, that effective temperature of the skin-depth layer increases from 0.28 up to *0.4 ОC* per degree of water heating. It was shown, that the radiation temperature of the water surface for the 8 mm waves and temperature range 30-50 *ОC* is determined not by the bulk kinetic water temperature, but by the effective temperature of the skin-depth layer formed under the influence of heat exchange with the atmosphere.

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