

## **Measurement of rain intensity by radiometer and double frequency radar remote sensing**

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Measurement of precipitation intensity is of great interest for municipal services and agriculture, in particular due to more cases of floods and landslides. At that constant monitoring of precipitation allows to schedule work of hydrological structures and prevent the relevant public authorities in time. Active and passive remote sensing is widely used now for measurement of precipitation parameters. But rains have difficult structure which depends on many parameters, so use of only active or passive methods based on the radar and radiometer sensing respectively do not allow to solve inverse problem and restore rain parameters. So at present different methods based on measurement of two independent parameters are of great interest, including double frequency, double polarization and active-passive methods. However three parameter distributions of rain drop sizes are applicable now as a precipitation model in the radio meteorology. In this case mentioned methods do not permit to measure all three distribution parameters and need to use additional information about precipitation in the form of a priori statistical data obtained by contact measurements.

That is why the paper is devoted to the development of active-passive method based on the double frequency radar and radiometer remote sensing. Such approach is of great interest because it allows to restore all three distribution parameters. Its validity is based on the different physical nature of the scattering and radiation of electromagnetic waves and measurement of more number of statistically independent parameters that permit to improve the information content and reliability of remote sensing results. At that small cost of radiometer and its simple construction permit it to be easy embedded in practical usage as add-on to radar.

In the paper the active-passive method for measurement of rain intensity is proposed for uniform precipitation based on double frequency radar and radiometer remote sensing. Numerical simulation of active-passive remote sensing of uniform rains was performed for wavelengths of radar 8.2 mm, 3.2 cm and radiometer 3.2 cm. It was shown that measurement error of proposed method does not exceed 10% in the range of rain intensity  $0 \div 30$  mm/h.