

Preliminary Detection of the Dangerous Meteorological Phenomena and Selections Closed Objects by the Help Radar with Variable Polarization

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The review of theoretical and experimental studies of meteorological events and reflections from ground and structures on it, covered by deposits, fogs and other meteorological object by dual-polarization radars are presented. Theoretical and experimental foundations of the polarization methods of detecting dangerous weather phenomena are made. Theoretical models of polarization characteristics (linear and elliptical) of radar signals from different kinds of clouds and precipitation are worked out and described. From common case of elliptically polarization is shows sensibility echo signal from microstructure of reflected particles. A choice of optimal polarization may by make.

Algorithms of the detection of a variety of hydrometeors and optimal polarization are discussed. Creation of algorithms of connection of microstructure and dangerous weather phenomena with polarization characteristics of radar signals are presented. Requirements to the equipment and up-dating of existing radars are formulated. These algorithms and requirements were realized on basis of polarization airborne and ground dual-polarization weather radars. These diversity-polarization radar are described.

Methods and means for remote detection of pre-storm state, increased electrical activity, zones of icing , hail and shower clouds, heavy precipitation, turbulence and other weather phenomena and conditions which are dangerous for flights of air vessel and human activities. It is necessary to note one more important developed direction in polarizing radiometeorology. It is a bistatic mode of reception of signals. With this mode considerably extends information of the polarizing characteristics of a signal. Theoretically and experimentally is shown, that with reception of signals not only with a return corner of dispersion of 180 degrees, but also in a general case with other corners of dispersion, volume of the information about reflecting object considerably extends. So from the point of view of meteorological tasks the detection of large particles in a cloud, spectrum of their distribution, phase structure is possible. The theoretical substantiation developed a technique and the equipment for realization of this mode of operations is resulted.

The prospects of application SAR in radiometeorological researches are discussed. One of the basic advantages of such aerials are an opportunity to operate the form of the diagram of a direction, to form some diagrams of the various form, that is very important with sounding volumetric diverse meteorological objects. Thus the high speed of scanning, opportunity of adaptation to varying external conditions for example, formation of failures on interfering reflections, opportunity is reached many functional of use, that is simultaneous maintenance of search, detection and support of various objects. So, the application of SAR in meteorological researches allows:

1. Quickly to translate the diagram of a direction from one part meteorological object on other or on other close located object, that is very important for comparison with evolution of a cloud especially with artificial influences.
2. Opportunity of adaptation to quickly varying conditions.
3. It is essential to raise resolution in space.
4. To operate during supervision the form of the diagram of a direction and quantity petals of it, that allows to minimize unnecessary reflections and to allocate researched object.

There are also other important qualities of use of SAR in meteorology. However these aerials are complex and also main while expensive for meteorological researches. Nevertheless progress in development and use of such aerials is obvious.