

Physics of upper atmosphere: from measurements to simulation

V.E.Kunitsyn

During recent decade, wide opportunities have been opened for obtaining large sets of tomographic-type data about the atmosphere. The existing satellite navigational constellations and receiving systems at the Earth's surface or at other satellites make it possible to obtain the series of tomographic data and reconstruct the refractive index distributions in the near-Earth environment. In recent years, actively progressing are various tomographic methods capable of imaging the spatial structure of the physical media: distribution of electron and neutral densities when probing the ionosphere and magnetosphere; distributions of temperature, density, pressure and humidity when probing the atmosphere, and so on. In this talk, the recent results obtained by methods of satellite radio tomography (RT) are presented. With such large volumes of tomographic data it becomes possible to state problems of constructing adaptive models of atmosphere that operate in quasi-real time. Such models based on huge data arrays can image the structure of atmosphere with rather high accuracy and resolution.

Applications of tomographic techniques employing different sounding sources (based on the use of both the existing satellite systems and the possible specialized satellites) are considered. Discussed are general problems of tomographic monitoring the near-Earth environment, different schemes of tomographic sounding, the problem of uniqueness, limitations and accuracy of tomographic reconstructions. Tomographic problems are debated of imaging the structure of the medium complemented by simulation in the regions of missing data. Prospects are discussed for constructing tomographic systems intended for regional and global monitoring the near-Earth environment.

Prof. Vyacheslav E. Kunitsyn
Head of the Department of the Atmospheric Physics
Faculty of Physics
Moscow State University

119899 Moscow
Moscow State University
Physical Faculty
phone/FAX 939-3806
email: kunitsyn@phys.msu.su