



Ponderomotive mechanism of the wave-particle interaction in space plasma

A. Guglielmi (1) and R. Lundin (2)

(1) Institute of Physics of the Earth, RAS, 123995, Moscow, Russia, (2) Swedish Institute of Space Physics, Teknikhuset, 90187, Umeå, Sweden (guglielmi@mail.ru)

The waves produced by plasma instabilities in many regions of space are inevitably nonlinear. A common property of the nonlinear waves is the appearance of time-averaged ponderomotive forces providing a specific nonlinear mechanism of the wave-particle interaction. The report is devoted to the relevant tasks, disputable issues, and unsettled problems related to the ponderomotive wave-particle interaction. The manifestations of this interaction in the space plasma are discussed. The relation between the theory and observations is emphasized. Two new methods for analyzing ULF wave data are presented. It is inferred that progress in the theoretical investigation of ponderomotive interplay between the waves and particles does not eliminate the necessity for careful study of unsolved problems posed in the past. As an example, we refer to the problem of the “gigantic” anharmonicity of the standing Alfvén waves. The prolonged existence of unsolved problems of such sort is undesirable because it is a challenge to our capability for understanding the space physics. The work is partly supported by grant RFBR 06-05-64143.