STUDY OF STABILITY OF BALLOONING MODES IN THE NEAR EQUATORIAL REGION OF THE EARTH PLASMASPHERE

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S u m m a r y

Study of plasma stability in the inner Earth magnetosphere is performed using the standard set of ballooning mode equations obtained naturally for finite beta plasmas in general magnetic field geometries with flux surfaces. It is shown that the known ballooning mode stability criterium is derived for low-beta plasma. The ballooning mode equations provide a solution of the problem in a general way. Ballooning-type disturbances with the maximum growth rates in the near equatorial plasmasphere are extensively studied. The sufficient condition for excitation of these waves is obtained, and dispersion equations for low-frequency wave modes are analyzed. It is shown that the poloidal Alfven waves and slow magne- tosonic waves are coupled when the plasma beta is relatively high. Conditions for the mode splitting are analyzed. Under these conditions, the flute and ballooning modes become unstable. Dependences of eigenfrequencies and growth rates on the plasma beta and L-parameter are discussed. Numerical estimates are presented. A possible mechanism of ballooning mode excitation in the radiation belts is proposed.