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On transition processes leading to stabilization of plasma cord in the L-2M stellarator

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The processes of energy accumulation and dissipation in a high-temperature plasma created and confined in a toroidal magnetic trap stellarator L-2M are investigated. The features of plasma transition to the stationary stage of energy confinement are studied. The initial stage of the discharge initiated by a microwave pulse in the mode of electronic cyclotron resonance plasma heating (ECR heating) is characterized first by a rapid increase in plasma energy within 1 ms from the start of microwave heating, and then by a rapid (~100 microseconds) increase in plasma energy losses recorded by a diamagnetic signal. These processes lead to the end of the growth of stored energy in the confined plasma. It is shown that the properties of this process at a constant microwave heating power of 400 kW differ significantly for different values of electron density. It is found that this process is primarily associated with processes occurring in the edge region of the plasma, in which a layer of stochastic magnetic surfaces is located at the boundary of the plasma cord. The possible influence of instabilities arising in the stochastic layer on this process, as well as the interaction of the boundary plasma with the walls of the vacuum chamber, is discussed.

Keywords: plasma magnetic confinement, stellarator, microwave heating, electron cyclotron resonance, plasma energy, transition processes.

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