Study of kinetic instabilities in a dense nonequilibrium plasma of a continuous ECR discharge in an open magnetic trap

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We study the stationary stage of plasma turbulence arising in a dense nonequilibrium plasma of an electron cyclotron resonant (ECR) discharge sustained in an open magnetic trap by the continuous microwave radiation. The use of high-power millimeter radiation of modern gyrotrons allows one to create in the laboratory a nonequilibrium two-component plasma characteristic of space conditions and to simulate the physical mechanisms of instabilities developing in space magnetic traps.
In the plasma created by continuous gyrotron radiation at a frequency of 28 GHz under ECR conditions in a mirror magnetic trap at the GISMO setup, nonthermal electromagnetic radiation at a frequency of 3-4 GHz was detected as a sequence of bursts with a duration of up to 500 ns. In most cases, bursts of radiation were wave packets with a deep amplitude modulation at a frequency of about 200 MHz, which leads to the formation of multiple "satellites" in the Fourier spectrum. The plasma emission frequency is lower than the electron cyclotron frequency in the source region, which may indicate the development of cyclotron instability of whistler waves in dense magnetoactive plasma.
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