

Creation of supersonic gas jet using a plasma accelerator..

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At present, plasma accelerators are successfully used for problems of controlled thermonuclear fusion [1].

Gas jet with high kinetic energy can effectively penetrate the magnetic field into the central region of tokamak. Gas injection into hydrogen or deuterium plasma was actively used for diagnostic purposes in experiments on various tokamaks and stellarators [2–4]. The gas flow velocity in these experiments was limited and close to the speed of sound (~1 km/s). For deep plasma probing, there is a need to jet velocity increase. To this end, this paper proposes method for generating helium jet stream moving at speed of several tens of kilometers per second. The method consists in transforming a dense and cold plasma jet into a gas flow. For this purpose, the plasma was passed through a long channel in which it could recombine as it moved. As a result, at the outlet of the recombination tube, a gas flow could be formed, the velocity of which is close to that of the plasma flow.

A high-velocity helium jet is planned to be used as part of a helium thermometer for deep probing of near-wall plasma in the Globus-M2 tokamak.

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