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Plasma flow in the magnetic nozzle ANDY SABO, ANDREI SMOLYAKOV, University of Saskatchewan, PETER YUSHMANOV, SERGEI PUTVINSKI, TAE Technologies — The flow of plasmas through the magnetic nozzle is an important element of the physics of some open mirror systems and is a defining feature of some electric propulsion devices. Here, the acceleration of quasineutral magnetized plasma via the magnetic nozzle is considered assuming anisotropic ion pressure in the Chew-Goldberger -Low (CGL) approximation while electrons are considered isothermal. Ions are accelerated by the electric field as well as by the ion pressure gradient forces (including the force due to the pressure anisotropy in the inhomogeneous magnetic field). Paraxial approximation is adopted so the problem is one-dimensional. Acceleration is considered from the plasma source producing ions with isotropic pressure and low (subsonic) ion velocity. Ion velocity undergoes sonic transition near the magnetic field maximum in converging-diverging magnetic nozzle configuration. The stationary solutions are obtained requesting the non-singular transition at the sonic point. The effects of the ionization and charge -exchange collisions on resulting profiles of the ion velocity, ion pressure, plasma density and potential are analyzed.

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