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Plasma jet accelerator optimization with supple membrane model[1] S.A. GALKIN, I.N. BOGATU, J.S. KIM, FAR-TECH Inc. — High density ($\geq 3 \times 10^{17} cm^{-3}$) and high Mach number (M>10) plasma jets have important applications such as plasma rotation, refueling and disruption mitigation in tokamaks. The most deleterious blow-by instability occurs in coaxial plasma accelerators; hence electrode shape optimization is required to accelerate plasmas to ∼200 km/s [1]. A full 3D particle simulation takes a huge computational time. We have developed a membrane model to provide a good starting point and further physical insight for a full 3D optimization. Our model approximates the axisymmetrical plasma by a thin supple conducting membrane with a distributed mass, located between the electrodes, and connects them to model dynamics of the blow-by instability and to conduct the optimization. The supple membrane is allowed to slip along the conductors freely or with some friction as affected by Lorenz force, generated by magnetic field inside the chamber and current on membrane. The total mass and the density distribution represent the initial plasma. The density is redistributed adiabatically during the acceleration. An external electrical circuit with capacitance, inductance and resistivity is a part of the model. The membrane model simulation results will be compared to the 2D fluid MACH2 results and then will be used to guide a full 3D optimization by the LSP code. 1. http://hyperv.com/projects/pic/

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