

A METHOD OF MATCHING
OF ION AND ELECTRON MOTION
EQUATIONS FOR PLASMA MOVING
IN A TOROIDAL MAGNETIC FIELD

A.I. Timoshenko, V.S. Taran, V.I. Tereshin

Institute of Plasma Physics, National Scientific Center
“Kharkiv Institute of Physics and Technology”
(1, Akademichna Str., Kharkiv 61108, Ukraine;
e-mail: *timoshen@yandex.ru*)

S u m m a r y

A model of the plasma motion in a toroidal magnetic field that quantitatively reflects the real peculiarities of the process is proposed. It is suggested to match the equations of motion for the electron and ion components using some results of the rigid-rotor model along with the guiding centers approximation. The analysis of the ion motion in a toroidal magnetic field with regard for polarization forces results in the conclusion that the drift approximation for ions is valid only under the condition of rather rarefied plasmas or extremely strong magnetic fields. It is shown that the holding of plasma on a curvilinear trajectory is provided by the Lorentz force acting on electrons. Ions are held by polarization forces.