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Plasma flow and electron losses in the expander divertor of FRC
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— Expander divertor is planned to be used in the design of next generation FRC device. The main goal of magnetic field expansion is to decrease heat load on the target plates and slow down heat losses through electron channel. A comprehensive study of expander divertor physics is initiated in Tri Alpha. It started with revision of pre-sheath electrostatic potential formation in the expander using both analytic and numerical means. An adaptation of 3D code KSOL has been developed to analyze electron physics and electrostatic potential formation. Initial results are presented. The key issue of the study is the analysis of the interaction of plasma with neutrals. Presence of neutrals affects expander physics in several ways. First of all, charge exchange and ionization modify pattern of ion flow in the expander magnetic field. That changes plasma density profile and affects formation of pre-sheath electrostatic potential. Second, ionization (as well as secondary electron emission) creates population of cold electrons in the expander which flow into confinement vessel and enhance out-flux of hot electrons. Distribution of neutrals is calculated in realistic geometry of expander divertor and effect on electron losses is evaluated.

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