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Numerical Studies of Transport in the Columbia Non-neutral Torus[1] BENOIT DURAND DE GEVIGNEY, THOMAS SUNN PEDERSEN, ALLEN H. BOOZER, Columbia University — The Columbia Non-neutral Torus (CNT) is a stellarator dedicated to the study of non-neutral plasmas on magnetic surfaces. Due to space charge imbalance such plasmas exhibit a very large radial electric field. In the absence of parallel electric fields, the induced $\vec{E} \times \vec{B}$ rotation dominates over the radial magnetic drifts and closes the orbits. However the confinement of trajectories is sensitive to the electrostatic boundary conditions at the plasma edge. Variations of the electric potential on magnetic surfaces, inherent to the CNT equilibrium, can also lead to bad orbits. Insulated probes inserted into the plasma charge up negative and create large, localized potential variations leading to $\vec{E} \times \vec{B}$ plasma flow out of the confining region. A code was written to solve for the electric potential in CNT allowing for a large variety of boundary conditions and capable of resolving the perturbation of the probes. Using results from this code as input for a Monte-Carlo electron drift orbit code we study how these perturbations affect the loss rate of electrons at different magnetic field strengths, and we compare our results to experimental data.

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