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Ion Flow Measurements and Plasma Current Analysis in the Irvine Field Reversed Configuration WAYNE HARRIS, ERIK TRASK, THOMAS ROCHE, EUSEBIO GARATE, WILLIAM HEIDBRINK, ROGER MCWILLIAMS, University of California - Irvine — The contribution of the ion current in the lab frame to the total plasma current is studied in the Irvine Field Reversed Configuration (IFRC). A charge-exchange neutral particle analyzer chops the emitted neutrals at a rate of 13 kHz and shows that the peak energy is below the 20eV minimum detectable energy threshold. A modified monochromator that is used to measure Doppler shifts of impurity lines indicates that there is a flow in the range of 5-7km/s in IFRC. By evaluating the collision times between the impurities and hydrogen, the dominant plasma ion species, it is concluded that the ions rotate with an angular frequency of $\sim 4 \times 10^4$ rad/s. Estimates of the ion current in the lab frame are accomplished by determining the ion density distribution using pressure balance, and by fitting the measured magnetic probe data to a theoretical equilibrium. The results from these estimates indicate that the ion current is 1-2 orders of magnitude larger than the measured plasma current of 15kA. Calculations of electron drifts from the equilibrium fields show that the electrons cancel most of the ion current.

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