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Neutral dynamics and ion energy transport in MST plasma[1]
ZICHUAN XING, MARK NORNBERG, DANIEL DEN HARTOG, SANTOSH KUMAR, JAY ANDERSON, Univ of Wisconsin, Madison — Neutral dynamics can have a significant effect on ion energy transport through charge exchange collisions. Whereas previously charge exchange was considered a direct loss mechanism in MST plasmas, new analysis indicates that significant thermal charge exchange neutrals are reionized. Further, the temperatures of the neutral species in the core of the plasma are suspected to be much higher than room temperature, which has a large effect on ion energy losses due to charge exchange. The DEGAS2 Monte Carlo simulation code is applied to the MST reversed field pinch experiment to estimate the density and temperature profile of the neutral species. The result is then used to further examine the effect of the neutral species on ion energy transport in improved confinement plasmas. This enables the development of a model that accounts for collisional equilibration between species, classical convective and conductive energy transport, and energy loss due to charge exchange collisions. The goal is to quantify classical, stochastic, and anomalous ion heating and transport in RFP plasmas.

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