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3D Field Modifications of Core Neutral Fueling In the EMC3-EIRENE Code[1] IAN WATERS, Univ of Wisconsin, Madison, HEINKE FRERICHS, OLIVER SCHMITZ, University of Wisconsin-Madison, JOON-WOOK AHN, Oak Ridge National Laboratory, GUSTAVO CANAL, TODD EVANS, General Atomics, YUEHE FENG, Max-Planck-Institut fr Plasmaphysik, STANLEY KAYE, RAJESH MAINGI, Princeton Plasma Physics Laboratory, VSEVOLOD SOUKHANOVSKII , Lawrence Livermore National Laboratory — The application of 3-D magnetic field perturbations to the edge plasmas of tokamaks has long been seen as a viable way to control damaging Edge Localized Modes (ELMs). These 3-D fields have also been correlated with a density drop in the core plasmas of tokamaks; known as pump-out. While pump-out is typically explained as the result of enhanced outward transport, degraded fueling of the core may also play a role. By altering the temperature and density of the plasma edge, 3-D fields will impact the distribution function of high energy neutral particles produced through ion-neutral energy exchange processes. Starved of the deeply penetrating neutral source, the core density will decrease. Numerical studies carried out with the EMC3-EIRENE code on National Spherical Tokamak eXperiment- Upgrade (NSTX-U) equilibria show that this change to core fueling by high energy neutrals may be a significant contributor to the overall particle balance in the NSTX-U tokamak: deep core ($\Psi < 0.5$) fueling from neutral ionization sources is decreased by 40-60 % with RMPs.

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