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Seeding Neoclassical Tearing Modes by resonant Pfirsch-Schlüter currents[1] C.C. HEGNA, University of Wisconsin — Neoclassical tearing mode (NTM) excitation requires a seeding mechanism that initializes a magnetic island above a threshold value. Often, NTM seeding is correlated with the appearance of some other MHD event,such as a sawtooth crash. The conventional model to explain the island seeding is to account for toroidal mode coupling producing a resonant radial magnetic perturbation that causes a forced reconnection at the NTM rational surface. Differential rotation between the magnetic signal of the MHD event and the rational surface of the NTM can provide significant shielding. In this work, we offer another explanation for the seeding process. In addition to the MHD event producing a resonant radial magnetic perturbation, the magnitude of the magnetic field strength is altered; a 3-D helical deformation of $|B|$ occurs. Helically resonant components of $|B|$ together with a pressure gradient at the NTM's rational surface produce singular Pfirsch-Schluter currents that can ultimately produce seed islands. This is a prominent island producing mechanism in 3-D stellarator equilibria. Additionally, neoclassical viscosities arise in accordance with the 3-D deformations which can partially shield the resonant currents.

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