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Mitigation of Alfvénic MHD Activity in the NSTX Tokamak by Externally Applied Perturbation Fields[1] ALESSANDRO BORTOLON, University of Tennessee Knoxville, WILLIAM W. HEIDBRINK, University of California Irvine, GERRIT J. KRAMER, JONG-KYU PARK, ERIC D. FREDRICKSON, Princeton Plasma Physics Laboratory, JEREMY D. LORE, Oak Ridge National Laboratory, MARIO PODESTA, Princeton Plasma Physics Laboratory — Observations from NSTX experiments demonstrate that externally applied 3D magnetic fields can be used to alter the dynamic of bursting and chirping Alfvén modes, driven by energetic beam ions [Bortolon et al., Phys. Rev. Letters, Vol. 110 (2013) 265008]. Pulses of static n=3 fields (δB/B $\sim$ 0.01 at the plasma edge) were applied during plasma discharges with persistent Global Alfvén Eigenmode activity (n=7-8, 400-700 kHz). In response to the perturbations, the mode amplitude, the bursting period and the frequency sweep were reduced by a factor of 2-3. For modes of weaker bursting character, the magnetic perturbation induced a temporary transition to a saturated continuous mode. The $\sim$5% drops of neutron emission rate during the pulses suggest perturbation of the fast ion population. Calculations of the perturbed fast-ion distribution function, made with the SPIRAL code, indicate that the 3D perturbation affects the orbits of fast ions that resonate with the bursting modes. The results represent an early demonstration of the possibility of controlling fast-ion instabilities by "phase-space engineering" of the fast-ion distribution function.

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