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Dissipative divertor experiments in NSTX V.A. SOUKHANOVSKII, LLNL, R. MAINGI, ORNL, C.J. LASNIER, LLNL, C.E. BUSH, ORNL, R. RAMAN, U. Washington, S. SABBAGH, Columbia U., R.E. BELL, R. KAITA, H.W. KUGEL, B.P. LEBLANC, J.E. MENARD, D. MUELLER, S.F. PAUL, A.L. ROQUEMORE, PPPL, NSTX TEAM — High divertor heat loads and material erosion are of particular concern for the spherical torus because of its compact divertor design. Experiments in NSTX with 1 - 6 MW NBI-heated lower single null plasmas reveal that, as in conventional tokamaks operating without actively pumped divertors, the inner divertor leg is naturally detached throughout most of the operational space in density and input power. The outer divertor strike point, with the peak heat flux up to 10 MW/m^2, however, remains attached even at the density approaching the Greenwald density. Dedicated experiments aimed at developing dissipative divertor scenarios in 3-4 MW NBI heated L- and H-mode plasmas using D_2 and neon injections will be described. High divertor neutral density and SOL collisionality $\nu^* > 60$ accessible only with D_2 injections into the private flux region lead to detachment of the outer strike point (OSP). The detachment is evidenced by a four-fold reduction of the peak heat flux and spectroscopic signatures of volume recombination. Similar heat flux reduction and $P_{rad} \simeq 0.3 \times P_{in}$, however without the OSP detachment, were obtained in H-mode plasmas with neon injections. This work is supported by the U.S. DOE under contract No. W-7405-Eng-48.

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