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Supersonic gas jet fueling experiments in NSTX V.A. SOUKHANOVSKII, LLNL, H.W. KUGEL, R. KAITA, A.L. ROQUEMORE, M.G. BELL, R.E. BELL, D.A. GATES, T. GRAY, B.P. LEBLANC, J.E. MENARD, D.P. STOTLER, PPPL, R. RAMAN, U. Washington, C.E. BUSH, R. MAINGI, ORNL — A high-pressure supersonic deuterium jet (SDJ) characterized by Mach number 4 has been used for fueling of ohmic and 2-6 MW NBI-heated L- and H-mode plasmas in NSTX. Reliable H-mode access was obtained with steady-state low field side fueling from the SDJ at a flow rate up to 4.5×10^{21} s^{-1}. Good progress has been made toward a controlled density H-mode scenario with SDJ fueling: the flow rate of the uncontrolled high field side gas injector was reduced by up to 20. As a result, comparable or slightly higher core and pedestal densities were obtained, with 5-15 % reduction of core and pedestal temperatures, and a change in the ELM regime from Type I and small, Type V ELMs to Type III ELMs. The SDJ fueling efficiency was found to be a function of the SDJ pressure (density) and the plasma - SDJ distance, typically held at 5-15 cm. Typical fueling efficiency values inferred from the plasma electron inventory analysis were in the range 0.1 - 0.35. Fast camera imaging of the SDJ indicated that the gas jet penetrated through the scrape-off layer and ionized before reaching the separatrix. This work is supported by U.S. DOE under Contracts No. W-7405-Eng-48 and DE-AC02-76CH03073.

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