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Measurement of Equilibrium Current Profiles of LDX Plasma[1]
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— We report measurement of the equilibrium plasma current profiles in the Levitated Dipole Experiment (LDX) that exhibit a peak beta in excess of 10 percent. The beta of an LDX plasma is calculated by solving the Grad-Shafranov equation using the plasma current profile determined from magnetic measurements. The relevant magnetic sensors include nine pick-up coils normal to the vessel surface, nine coils parallel to the surface, and eight magnetic flux loops. Since the LDX dipole field is produced by a superconducting current ring, the dipole current decreases as the plasma current increases. Equilibrium profiles using different pressure models have been investigated. We find that the magnetic measurements primarily determine the plasma dipole moment, and additional constraints, including ECRH resonance zone locations and x-ray emission profiles, are needed to uniquely specify a pressure profile. The reconstruction results will be discussed along with the conditions that lead to the creation of high beta plasmas.

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