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Testing of a Plasmadynamic Hypervelocity Dust Accelerator[1]
CATALIN M. TICOS, ZHEHUI WANG, LEONID A. DORF, G.A. WURDEN, Los Alamos National Laboratory, NSTX COLLABORATION — A plasmadynamic accelerator for microparticles (or dust grains) has been designed, built and tested at Los Alamos National laboratory. The dust grains are expected to be accelerated to hypervelocities on the order of 1-30 km/s, depending on their size. The key components of the plasmadynamic accelerator are a coaxial plasma gun operated at 10 kV, a dust dispenser activated by a piezoelectric transducer, and power and remote-control systems. The coaxial plasma gun produces a high density (10^{18} cm^{-3}) and low temperature ($\sim$ 1 eV) plasma in deuterium ejected by $\mathbf{J} \times \mathbf{B}$ forces, which provides drag on the dust particles in its path. Carbon dust particles will be used, with diameters from 1 to 50 μm. The plasma parameters produced in the coaxial gun are presented and their implication to dust acceleration is discussed. High speed dust will be injected in the National Spherical Torus Experiment to measure the pitch angle of magnetic field lines.

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