Abstract Submitted
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Smoky Plasma SCOTT ROBERTSON, ZOLTAN STERNOVSKY, University of Colorado, Boulder — The mesosphere contains nanometer-sized smoke particles that have formed in the vapor trails of meteors and that are thought to be the condensation nuclei for noctilucent clouds. Laboratory dusty plasmas often have the dust particles in a layer at the lower sheath boundary. We examine the possibility of creating in a double-plasma device a smoky plasma in which the particles would be sufficiently small to fill the plasma nearly uniformly while being sufficiently large to exhibit multiple charge states that would distinguish the smoky plasma from one containing heavy negative ions. For example, nanometer sized atomic clusters of Ag (4 nm radius, 10,000 atoms) can be generated in an oven with an inert gas that carries the particles into the plasma chamber. These particles will become charged negatively with about 8 electrons and will then be electrostatically contained by the presheath electric field The confining electric force will also be greater than the ion drag force that could otherwise create a void in the smoke particle density distribution. This plasma would make possible, for example, experiments on the coupling of electrostatic waves to fluid turbulence by the neutral drag force. An acoustic wave propagating in smoky plasma will exert different drag forces on electrons, ions, and smoke particles thus creating a charge-separation electric field that can be measured by potential probes. This coupling may be the origin of electrostatic fluctuations seen by rocket-borne electric field probes in the mesosphere. Supported by the NSF/DOE Plasma Science Initiative.

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