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Kinetic Modeling of the Advanced Plasma Source BENJAMIN SCHROEDER, RALF PETER BRINKMANN, Theoretical Electrical Engineering, Ruhr University Bochum, JENS HARHAUSEN, ANDREAS OHL, Leibniz Institute for Plasma Science and Technology — Plasma ion assisted-deposition (PIAD) is a well-established technology for the creation of high quality coatings on mirrors, lenses, and other optical devices. This paper investigates the Advanced Plasma Source (APS), a plasma beam source employed for PIAD. A field enhanced glow discharge generates a radially expanding plasma flow with an ion energy of about 80 - 120 eV. Charge exchange collisions with the neutral background gas (pressure 0.1 Pa and below) produce a cold secondary plasma which expands as well. A hybrid model is developed which consists of a drift-kinetic description of the magnetized electrons, coupled to a simplified Boltzmann equation for the primary ions and fluid-dynamic representation of the secondary ions. All results compare well to experiments conducted at a commercial APS system.

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