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Heat Transmission through Weakly Collisional Plasma Sheath<sup>1</sup> ALEXANDER V. KHRABROV, IGOR D. KAGANOVICH, Princeton Plasma Physics Laboratory — Under the condition of weak collisions, the distribution of plasma electrons in a sheath near the wall becomes anisotropic and non-Maxwellian due to the "loss cone" effect. As a result, the structure and the transport properties of the sheath are strongly modified relative to the collisional case. This non-local kinetics may be important for analyzing edge plasmas in magnetic confinement devices, such as the divertor scrape-off layer. For example, with a velocity distribution strongly depleted in the direction normal to the wall, when most of the electron energy is in the perpendicular motion, the heat transmission factor of the sheath can reach a low value of about 2, compared to the conventional theoretical value of 7. We present the results of numerical simulations with a particle-in-cell code, in which both the sheath and the quasi-neutral plasma are modeled self-consistently (not requiring approximated boundary conditions at the sheath edge). The simulation takes into account both electron-neutral and ion-neutral collisions, as well as Coulomb collisions between the electrons.

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