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Sheath instabilities at large secondary electron emission in Hall thrusters PASCAL CHABERT, ANTOINE TAVANT, THOMAS CHAROY, ANNE BOURDON, LPP, CNRS Ecole Polytechnique — Plasma-wall interactions are complex and often govern the overall operating regime of a plasma device. Plasmas are connected to walls through a thin boundary layer called sheath, where most of the potential and density gradients localize. The sheath physics has been extensively studied and models exist for most of the practical situations. However, several phenomenon observed in numerical simulations or in experiments remain unexplained. It has been recently found in particle-in-cell (PIC) simulations treating plasma-wall interactions in hall thrusters that the sheath may become unstable when secondary electron emission from the walls, induced by energetic primary electrons, is an important phenomenon. This presentation presents a theory of these instabilities. The theory is based on global balance equations for the electron energy and the charges in the sheath. The theory is compared to PIC simulations.

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