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A Vlasov-BCA method for numerical simulations of the plasma sheath structure in presence of a material releasing wall DAVIDE CURRELI, RINAT KHAZIEV, SHANE KENILEY, STEVEN MARCINKO, University of Illinois at Urbana Champaign — We present a coupled Vlasov-BCA (Binary Collision Approximation) method for the simulation of the plasma sheath in presence of a material-releasing wall. The method couples a Vlasov solver of a multi-species plasma with an improved version of the TRIDYN code including surface dynamic composition, multi-component targets, and surface roughness effects. The classical problem of defining proper boundary conditions into a Vlasov code is solved by using at the boundary distribution functions calculated thanks to the BCA module. A standard kernel smoother is adopted to control the noise level of the distributions predicted by the BCA. When solved in one dimension the method is computationally inexpensive and allows to resolve the plasma sheath structure in presence of material sputtering, backscattering, and implantation, for both mono-component and multi-component targets. From the moments of the distribution functions, the particle and heat fluxes of both the plasma and the material species can be easily derived.

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