A kinetic model of plasma-probe interaction : theory and numerics

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We are interested in the modeling of a cylindrical Langmuir probe interacting with two species electrostatic plasma. We consider the stationary Vlasov-Poisson equations written in polar coordinates with absorbing boundary conditions at the probe. We will present the general methodology based on a phase-space analysis to construct stationary solutions and explain how to deal with unpopulated orbits. Eventually, we shall discuss how to discretize the model and validate the numerical method with the so called radial sheath solutions. Two dimensional simulations will be presented, showing that some unpopulated orbits do exist when the angular momentum of the particles increase.

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