

Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

A kinetic description of the effects of temperature gradients in low-temperature plasmas for space propulsion¹ ROMAIN LUCKEN, ANTOINE TAVANT, ANNE BOURDON, PASCAL CHABERT, Laboratoire de Physique des Plasmas — A common assumption in the modeling of low temperature plasma discharges consists in treating the plasma as isothermal. While this assumption is valid to estimate the main bulk plasma properties in non-magnetized discharges or magnetized plasma columns, it yields erroneous predictions of phenomena involving large electric fields, such as plasma sheaths and magnetic filters. We show here that the electron temperature can drop by one order of magnitude in the sheath, with significant consequences for example in electron induced secondary electron emission, since the emission rate strongly depends on the local temperature at the vicinity of wall. This work, based on multiple 1D and 2D particle-in-cell simulations of plasma discharges in typical conditions used for space propulsion, is a first step towards understanding the kinetic origin of heat fluxes in low-temperature low-pressure plasmas, and their role in the plasma transport and the plasma-wall interactions.

¹ANR-16-CHIN-0003-01 ; CINES2017-A0020510092/A0040510092

Romain Lucken
No Company Provided

Date submitted: 16 Jun 2018

Electronic form version 1.4