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**Fluid model of magnetic drifts and instabilities in magnetized low-temperature plasma sources**[1] GERJAN HAGELAAR, ROMAIN FUTTERSACK, ROMAIN BAUDE, LAPLACE, CNRS and University of Toulouse —

This paper presents a self-consistent fluid model of low-temperature plasma transport across a magnetic field, designed in particular to describe magnetic drifts and instabilities in the plane perpendicular to the field lines. The model is based on electron and ion continuity equations and full momentum equations and an electron energy equation, without a priori assumptions on the ordering of physical scales (Larmor radii, mean free paths, geometrical dimensions) so that it can cover a wide range of conditions, from non-magnetized collisional plasmas to tokamak edge plasmas. The model is applied to different basic configurations of immediate interest for applications such as ion negative sources. We show that in a typical magnetic filter configuration (e.g. in the ITER negative ion source or Pegases thruster), the magnetic drift is obstructed by the chamber walls which induces an asymmetric electron flux across the filter, scaling as 1/B. These results have been confirmed by experimental data from an in-house laboratory set-up. We also present model results on the Cybele ion source featuring a magnetized plasma column, in which the transport is governed by rotating instabilities and very sensitive to the boundary conditions at the end of the column.

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Gerjan Hagelaar
LAPLACE, CNRS and University of Toulouse

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