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Fluid modeling of low-temperature plasma transport across a magnetic field[1] R. FUTTERSACK, G.J.M. HAGELAAR, LAPLACE, University of Toulouse, France, P. TAMAIN, A. SIMONIN, CEA, IRFM, France — While various low-temperature plasma sources operating with a steady magnetic field are widely used in industrial and research applications, the knowledge of magnetized transport in these plasmas is still incomplete. As the transport of charges and currents in such plasma sources may show a complex and ill-understood behavior, we investigate the issue of magnetized transport as such. A new 2D fluid model has been developed, combining the usual methods of low-temperature plasma modeling with techniques drawn from fusion plasmas research, and therefore allowing to explore a large range of magnetic field strengths and topologies. We then analyze simulations related to representative experiments with various magnetic field configurations in order to characterize the transport in these low-temperature plasmas, and compare the results with experimental data and application-oriented models. For two different negative ion sources, the main behavior of the plasma is recovered, with the emergence of asymmetries due to the drifts induced by the magnetic field. The model is also able to capture the transient dynamics of the plasma such as certain types of instabilities.

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R. Futtersack
LAPLACE, University of Toulouse, France

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