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Nonambipolar electron fluxes in 2D unmagnetized inductively coupled plasma[1] EUGENE BOGDANOV, ANATOLY KUDRYAVTSEV, St.Petersburg State University, LEV TSENDIN, St.Petersburg State Polytechnical University — It is generally accepted that electron and ion fluxes in unmagnetized, current-free plasmas obey the ambipolar diffusion, i.e., that electron and ion flux densities in the quasineutral plasma are equal and hence the total current in the plasma is zero. This scenario originates from a well-known one-dimensional analysis performed by Schottky. But the real plasma objects are a two-or three-dimensional when as the plasma density and the electron temperature is spatially inhomogeneous. As it was pointed in [Rozhansky A.V., Tsendin L.D. Transport Phenomena in Partially Ionized Plasma. Taylor and Francis. 2001], in a 2D plasmas where both the density and the electron temperature are disturbed, it is impossible to create the potential electric field which equalizes the electron and ion fluxes everywhere in a plasma volume [1]. It means that the considerable radial electron vortex current arises which doesn't obey the ambipolarity condition je(x,r) = ji(x,r). Our 2D fluid simulations of ICP discharges in argon and oxygen show that electron flux always has a large vortex component as in the case of conducting and insulating walls. It means that in inhomogeneous 2D discharges electron transport is never ambipolar.

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