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Laser induced fluorescence measurements of ion velocity in a DC magnetron microdischarge with self-organized drift wave modes propagating in the direction opposite the E x B electron drift velocity[1] CHRIS YOUNG, NICOLAS GASCON, ANDREA LUCCA FABRIS, MARK CAPPELLI, Stanford University, TSUYOHITO ITO, Osaka University, STANFORD PLASMA PHYSICS LABORATORY COLLABORATION, OSAKA UNIVERSITY CENTER FOR ATOMIC AND MOLECULAR TECHNOLOGIES COLLABORATION — Evidence is presented of rotating azimuthal wave structures in a planar DC magnetron microdischarge operating in argon and xenon. Plasma emission captured using a high frame rate camera reveals waves of varying azimuthal modes propagating in the negative E x B direction. The dominant stable mode structure depends on discharge voltage. The negative drift direction is attributed to a local field reversal arising from strong density gradients that drive excess ions towards the anode. The transition between modes is shown to be consistent with models of gradient drift-wave dispersion in the presence of such a field reversal when the fluid representation includes ambipolar diffusion along the direction parallel to the magnetic field. Time-average and time-synchronized laser induced fluorescence measurements are carried out to elucidate the anode-bound ion dynamics driven by the field reversal.

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