36th Annual Meeting, APS Division of Plasma Physics
7–11 November 1994—Minneapolis, MN
ABSTRACT SUBMITTAL FORM

Subject Classification Category (refer to DPP Category list) 1.2 Non-neutral ☐ **Theory** ☒ **Experiment**

Electron Vortex Dynamics in an Irrotational Shear Flow: Comparison with the 2-D Fluid Theory of Moore and Saffman*, D.L. Eggleston, Occidental College -- A basic issue in vortex physics concerns the fate of a vortex in a shear flow. Our vortex is an off-axis electron column in a nonneutral plasma trap; its vorticity Ω can be varied over a factor of ten. A shearing azimuthal E×B drift velocity v is produced by a biased wire which runs along the axis of the confinement cylinder. The bias can be either positive or negative which allows the shear rate $e = \partial v/\partial r$ to either favor or oppose the vortex motion. The measured vortex lifetime T increases sharply when $e/\Omega = -0.163 \pm 0.015$ (here we take $e > 0$ for positive wire bias and $\Omega > 0$ for electrons). This critical value is in good agreement with the theoretical value $e/\Omega = -0.15$ (see D.W. Moore and P.G. Saffman, Aircraft Wake Turbulence, p.339ff, Plenum, New York, 1971). When $e/\Omega < -0.16$, T is constant and equal to the time T_0 to disperse a patch of zero vorticity. When $-0.16 < e/\Omega < 0$, T increases with a roughly exponential dependence on e/Ω. For $e/\Omega > 0$, T is roughly constant with a value of $10^4\ T_0$. We speculate that this upper limit is set by electron diffusion which slowly weakens the vortex.

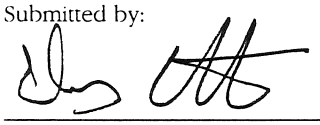
* Supported by ONR N00014-89-J-1399

☒ Prefer Poster Session
☐ Prefer Oral Session
☒ This poster/oral should be placed in the following grouping: (specify order)
Non-neutral plasma session

☐ Special Audiovisual Requests (e.g., movie projector)

☐ Other Special Requests

Submitted by:



(Signature of APS Member)

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A faxed copy is NOT acceptable. This form, or a computer-generated form, plus TWO COPIES, must be received by **Friday, 8 July 1994** at the following address:

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