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$E \times B$ **shear instability of two-dimensional electron filaments subject to applied strain flows**[1] NOAH HURST, JAMES DANIELSON, DANIEL DUBIN, CLIFFORD SURKO, University of California, San Diego — Recent work has demonstrated the ability to subject pure electron plasmas to external $E \times B$ flows in a Penning-Malmberg trap in a way that preserves the two-dimensional (2D) drift dynamics [1,2]. The behavior of the electrons in this regime is directly analogous to that of the vorticity in a 2D inviscid, incompressible fluid [3], and so this technique allows one to study driven vortex dynamics using electron plasmas in the laboratory. Presented here are experiments in which thin electron filaments (i.e., $E \times B$ shear layers) are created using a strong external strain flow. Following this, the Kelvin-Helmholtz/Rayleigh instability of these filaments is studied both in the absence and in the presence of external strain flows. The data agree with a simple theoretical model in the linear regime [4]. Nonlinear behavior of the instability is characterized by a reduction of transport perpendicular to the filament as the external strain rate is increased. [1] N. C. Hurst, et. al., Phys. Rev. Lett. 117, 235001 (2016) [2] N. C. Hurst, et. al., J. Fluid Mech. 848, 256 (2018) [3] C. F. Driscoll and K. S. Fine, Phys. Fluids B 2, 1359 (1990) [4] D. G. Dritschel, et. al., J. Fluid Mech. 230, 647 (1991)

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