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Experimental characterization of broadband electrostatic noise due to plasma compression[1] AMI M. DUBOIS, University of Wisconsin - Madison, EDWARD THOMAS, JR., Auburn University, WILLIAM E. AMATUCCI, GURUDAS GANGULI, Naval Research Laboratory — For a wide variety of laboratory and space plasma environments, theory states that plasmas are unstable to transverse shear flows over a very broad frequency range, where the shear scale length (L_E) compared to the ion gyro-radius (ρ_i) determines the character of the shear-driven instability that may prevail. During active periods in the Earth's magnetosphere, such sheared flows are intensified and broadband electrostatic noise (BEN) is often observed by satellites traversing natural boundary layers. An interpenetrating magnetized plasma configuration is used to create a transverse velocity shear profile similar to that found at natural space plasma boundary layers. The continuous variation and the associated transition of the instability regimes driven by the shear flow mechanism are demonstrated in a single laboratory experiment. For the first time, broadband wave emission, which is correlated to increasing/decreasing stress (i.e., ρ_i/L_E) on a plasma boundary layer, is found under controlled and repeatable conditions. This result provides evidence that the compression/relaxation of a plasma boundary layer leads to a BEN signature and holds out the promise for understanding the cause and effect of the in situ observation of BEN by satellites.

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