Quantitative measurements of the nonlinear coupling of diocotron modes characterize both the expected conservative coupling term and a new term arising from separatrix dissipation. Here, the pure electron plasma columns have a controllable axial trapping separatrix created by an applied $\theta$-symmetric wall “squeeze” voltage. Prior experiments\(^2\) established that this separatrix 1) enables and damps the “Trapped Particle” diocotron mode, and 2) damps $m \neq 0 \; k_z \neq 0$ plasma modes; and, in combination with external $\theta$-asymmetries, 3) damps $m \neq 0 \; k = 0$ diocotron modes, and 4) causes enhanced bulk plasma expansion and loss. The present experiments observe the resonant interaction between the traditional $m=2 \; k=0$ diocotron mode and the $m=1$ TP diocotron mode. The initial parametric decay of $m=2$ into $m=1$ is adequately predicted by the conservative nonlinearity arising from the continuity equation. However, the late-time evolution clearly requires (and quantifies) a dissipative nonlinear term which is not yet understood theoretically. This same dissipative coupling is also observed for non-resonant interactions, as in bulk plasma transport from field errors.

\(^1\)Supported by NSF grant PHY-0354979.