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Spatiotemporal Measurements of Fluctuations in a DC Discharge¹ B. MCGEEHAN, D. OLIVAN, S.A. COHEN, E. TORBERT, Plasma Physics Laboratory, Princeton University — Periodic and chaotic fluctuations in a restricted DC discharge in neon have been measured with capacitive probes placed along the discharge column and by monitoring the discharge current. These fluctuations, in the frequency range 1-50 kHz, show multiple period-doubling bifurcations that eventually lead to chaos as the discharge current is varied. From these bifurcations the Feigenbaum constants have been extracted. A spatiotemporal analysis of the system shows the characteristics of these fluctuations as well as the dispersion relation. The analysis makes use of biorthogonal decomposition, fourier transforms, and other routines to extract space, time, and frequency information needed to obtain the Lyapunov exponents and to reconstruct the phase maps of the system.

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Brendan McGeehan Plasma Physics Laboratory, Princeton University

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