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Delayed Feedback and Chaos on the Driven Diode-Terminated Transmission Line VASSILI DEMERGIS, STEVEN ANLAGE, Dept of Physics, Univ of Maryland, College Park, EDWARD OTT, THOMAS ANTONSEN, Institute for Research in Electronics and Applied Physics, Univ of Maryland, College Park, ALEXANDER GLASSER, MARSHAL MILLER — A simple model of a distributed, non-linear circuit that produces chaos at GHz frequencies is introduced and tested experimentally. The model circuit is a driven, diode-terminated transmission line with the transmission line impedance mismatched to that of the source. This model is motivated by the need to understand the mechanisms for RF upset in computer circuits. Experimental tests of the model were performed with driving frequencies of 10 MHz to 1.2 GHz, driving powers of -30 to +50 dBm, and delay times from 3 to 20 ns. Diode reverse recovery times (/tau/) ranged from 4 to 100 ns. Experimentally, it was found that chaotic behavior was strongly dependent on the reactance of the system as seen by the driving source, and influenced by an applied DC voltage-bias across the diode. In the experiments that showed period-doubling and / or chaos, the /tau/ was on the order of both the driving period and the delay time of the circuits. Comparisons between theory and experiment are in general agreement.Work supported by the DOD MURI AFOSR Grant F496200110374 and DURIP Grants FA95500410295, FA95500510240.

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