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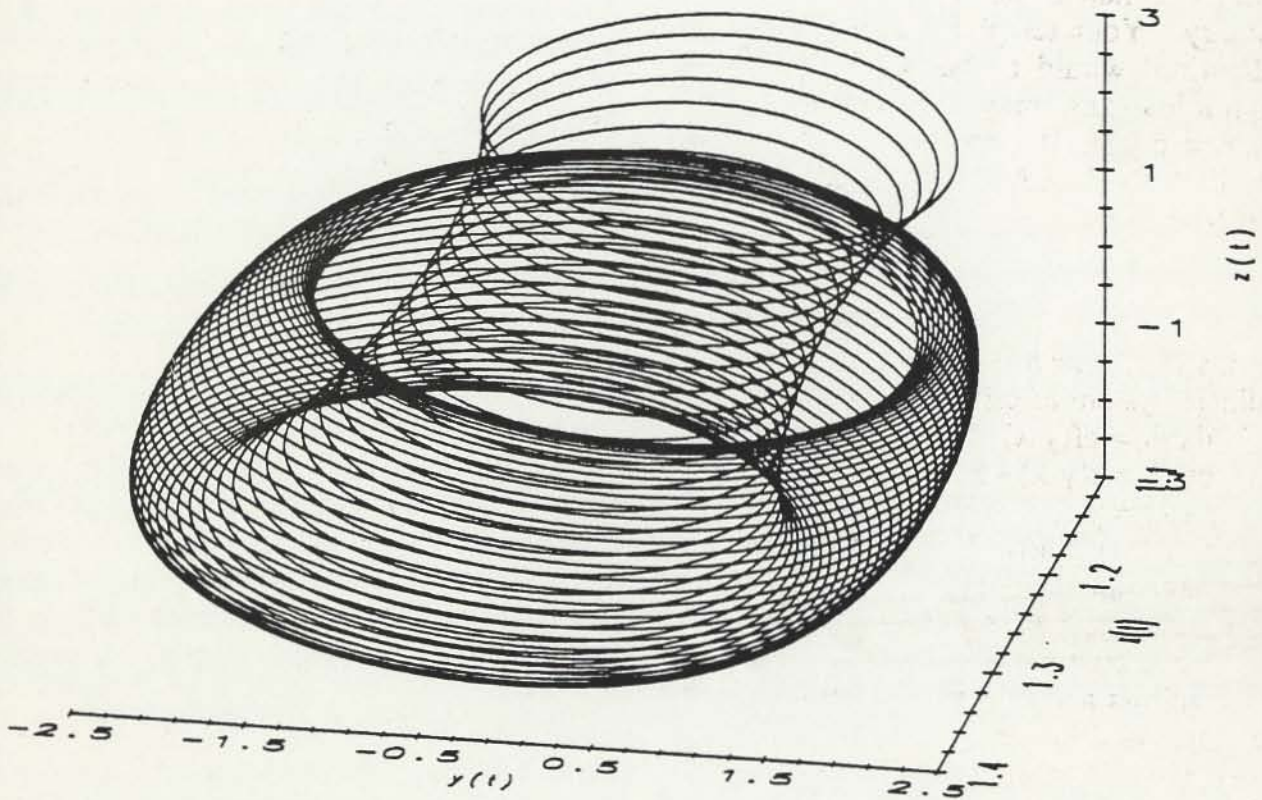
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COVER

The inverted mushroom of the figure is traced by a single orbit $[x(t), y(t), z(t)]$ of the nonlinear system of differential equations

$$dx/dt = cf(y-x)$$

$$dy/dt = f(y-x) - z$$

$$dz/dt = y$$

$f(v) = 0.07v - 0.085(|v+1| - |v-1|)$, c is a constant, and t increases from 0 to 400. The system models a simple two-looped electrical circuit built by L. O. Chua and his colleagues, a circuit that has two capacitors (c is the ratio of the capacitances), an inductor, and a nonlinear resistor with characteristic modeled by f . The functions $x(t)$, $y(t)$, and $z(t)$ model the voltages across the capacitors and the current through the inductor. As the parameter c is increased from 0.1 (the value used in the figure) to 50, the circuit and the orbits of the system display an amazing sequence of bifurcations, period doublings, and finally chaos.

References:

1. R.L. Borrelli, C. Coleman, W.E. Boyce, *Differential Equations Laboratory Workbook*, 249-252, 328-329; John Wiley and Sons, New York, 1992.
2. T. Matsumoto, L.O. Chua, R. Tokunaga, Chaos via torus breakdown; *IEEE Trans. Circuits Syst.*, (CAS-34(3):240-253 (March 1987)).

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