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The vase cavity: a model for chaotic ionization KEVIN MITCHELL, University of California at Merced, PAUL HANSEN, JOHN DELOS, College of William and Mary — In recent investigations of chaotic ionization, we predicted that an excited hydrogen gas in parallel electric and magnetic fields can ionize by emitting a train of electron pulses – a chaos-induced pulse train. Here, we analyze another physical system, consisting of an open reflecting two-dimensional cavity whose dynamics model chaotic ionization. This system could be experimentally realized as a microwave or optical cavity (or even an electronic microjunction.) The reflecting boundary of the cavity is shaped like the profile of a vase, containing a bulbous interior region, a narrow neck, and a flange-shaped opening. A pulse enters the cavity as a circular wave. This wave bounces around chaotically inside the cavity along classical trajectories, and eventually exits as a chaos-induced pulse train, analogous to that predicted for the ionization problem. The structure of this pulse train can be analyzed through study of the topological properties of a homoclinic tangle.

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