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Arnold Tongue Mixed Reality States in an Interreality System VADAS GINTAUTAS, ALFRED HUBLER, University of Illinois at Urbana-Champaign — We present experimental data on the limiting behavior of an interreality system comprising a virtual horizontally driven pendulum coupled to its real-world counterpart, where the interaction time scale is much shorter than the time scale of the dynamical system. We present experimental evidence that if the physical parameters of the virtual system match those of the real system within a certain tolerance, there is a transition from an uncorrelated dual reality state to a mixed reality state of the system in which the motion of the two pendula is highly correlated. The region in parameter space for stable solutions has an Arnold tongue structure for both the experimental data and for a numerical simulation. As virtual systems better approximate real ones, even weak coupling in other interreality systems may produce sudden changes to mixed reality states. This work was supported by the National Science Foundation Grant No. NSF PHY 01-40179, NSF DMS 03-25939 ITR, and NSF DGE 03-38215.

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