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Experimental observation of soliton propagation and annihilation in a hydromechanical array of one-way coupled oscillators PATRICK M. ODENTHAL, JOHN F. LINDNER, KELLY M. PATTON, JAMES C. GALLAGHER, Department of Physics, The College of Wooster, Wooster OH 44691, BARBARA J. BREEN, Department of Physics, University of Portland, Portland OR 97203 — We have experimentally realized unidirectional or one-way coupling in a mechanical array by powering the coupling with flowing water. In cyclic arrays with an even number of elements, soliton-like waves spontaneously form but eventually annihilate in pairs, leaving a spatially alternating static attractor. In cyclic arrays with an odd number of elements, this alternating attractor is topologically impossible, and a single soliton always remains to propagate indefinitely. Our experiments with 14 and 15-element arrays highlight the dynamical importance of both noise and disorder and are further elucidated by our computer simulations. This work was supported in part by NSF DMR-0649112.

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