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Non-equilibrium steady states in "PT-symmetric" classical chains
DANNY SWEENEY, Indiana University Purdue University Indianapolis (IUPUI), DONALD PRIOUR, Youngstown State University, ANDREW HARTER, YOGESH JOGLEKAR, Indiana University Purdue University Indianapolis (IUPUI) — Open systems with balanced, spatially separated gain and loss undergo a transition, called parity-time (PT) symmetry breaking transition, that is absent in their closed counterparts. This transition is manifest in the system changing from a quasi-equilibrium state to a state far removed from equilibrium. We investigate a chain of classical particles in the presence of a localized loss and a stochastic drive that is spatially separated from the loss site. This setup generalizes the traditional Langevin noise approach for modeling thermalization in a chain. We analytically and numerically show that the system can be in either in a non-equilibrium steady-state or does not thermalize. We further show that the steady-state, non-constant temperature profile of the chain can be engineered by appropriate choices of the loss location and the stochastic drive location. This work was supported by NSF grant no. DMR-1054020.

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