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 coun-
terparts. 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.