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Critical Slowing Down Near Bifurcation Point in Parametrically-driven Magneto-optical Trap MYOUNG-SUN HEO, KIHWAN KIM, KIWHAN LEE, WONHO JHE, School of Physics and Center for Near Field and Atom Photon Technology, Seoul National University, Seoul 151-742, Korea, HEUNG-RYOUL NOH, Department of Physics, Chonnam National University, Gwangju 500-757, Korea, ROBIN KAISER, Institut Non Linéaire de Nice UMR 6618 du CNRS, 1361 route des Lucioles, F-06560 Valbonne, France — Equilibrium phase transitions have been studied extensively over the last five decades. But on the other hand, critical phenomena in systems far from equilibrium are still challenging subjects and known to have some correspondences with those in equilibrium. And In this case the system of interest is usually nonlinear for it reveals extra abundant features such as bifurcation and chaos including non-equilibrium phase transition. Our parametrically driven magneto-optical trap of neutral atoms has these natures; it is an anharmonic trap and induces Hopf bifurcation. For the first step to study non-equilibrium phase transition we focused on the critical slowing down of the relaxation time occurring near bifurcation point. Experimentally we have seen it by measuring the time taken for atoms to move from non-steady to steady state, and obtained the dynamic critical exponent. Estimated values from Monte Carlo simulation were also compared with above results.

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