1121-37-262 **Aminur Rahman*** (ar276@njit.edu), Culimore Hall, University Avenue, Department of Mathematical Sciences, Newark, NJ 07103. *Neimark-Sacker bifurcations and evidence of chaos in a discrete dynamical model of walkers.*

Bouncing droplets on a vibrating fluid bath can exhibit wave-particle behavior, such as being propelled by interacting with its own wave field. These droplets seem to walk across the bath, and thus are dubbed walkers. Experiments have shown that walkers can exhibit exotic dynamical behavior indicative of chaos. While the integro-differential models developed for these systems agree well with the experiments, they are difficult to analyze mathematically. In recent years, simpler discrete dynamical models have been derived and studied numerically. The numerical simulations of these models show evidence of exotic dynamics such as period doubling bifurcations, Neimark–Sacker (N–S) bifurcations, and even chaos. For example, in [Gilet, PRE 2014], based on simulations Gilet conjectured the existence of a supercritical N-S bifurcation as the damping factor in his one-dimensional path model. We prove Gilet's conjecture and more; in fact, both supercritical and subcritical (N-S) bifurcations are produced by separately varying the damping factor and wave-particle coupling for all eigenmode shapes. Then we compare our theoretical results with some previous and new numerical simulations, and find complete qualitative agreement. (Received July 19, 2016)