

1072-37-48

Rocio E. Ruelas, Richard H. Rand* (rrand@cornell.edu) and **David G. Rand.** *Nonlinear Evolutionary Dynamics of a Rock-Paper-Scissors System with Periodic Coefficients.* Preliminary report.

We investigate a problem in evolutionary game theory based on replicator equations with periodic coefficients. This approach to evolution combines classical game theory with differential equations. The Rock-Paper-Scissors system studied has application to the population biology of lizards and to bacterial dynamics. The presence of periodic coefficients models variations in the environment due to seasonal effects.

This work extends previous work (Communications in Nonlinear Science and Numerical Simulation 16:3887-3895, 2011) by considering the effect of nonlinear terms. A Poincare map P is obtained by taking cuts at times $t=nT$, $n=0,1,2,\dots$, where T is the period of the periodic coefficients. Periodic points in P correspond to subharmonic periodic motions in the original system. The properties of the map P are explored by using perturbation methods and numerical integration. (Received June 13, 2011)