1107-91-489 **Russ deForest** and **Andrew Belmonte*** (alb18@psu.edu), Dept of Mathematics, Pennsylvania State University, University Park, PA 16803. *Fitness gradient flux in evolutionary games: numerical and analytic results.*

The replicator dynamics commonly used in evolutionary game theory is consistent with the interpretation of a fitness function defined as the expected payoff for a given strategy played within a population. This fitness characterizes the interactions between individuals playing each strategy, and has a nonlinear dependence on the population densities. We consider the spatial patterns and steady states for partial differential equations (PDEs) which include a fitness gradient flux, defined for two-player symmetric games characterized by a payoff matrix. We find numerically that the fitness gradient flux alters the 1D Hutson-Vickers travelling wave solutions, and leads to spatially structured, stable coexistence states for the prisoner's dilemma. We also present existence results for two strategy games in the "frozen strategy" PDEs, in which migration is due exclusively to the fitness gradient flux (without replicator dynamic or diffusion). We show that there are weak steady state solutions that are in H^1, but not smooth everywhere. (Received January 20, 2015)