Spatial games with cyclic interactions: the response of empty sites[1] BART BROWN, MICHEL PLEIMLING, Virginia Tech — Predator-prey models of the May-Leonard family employ empty sites in a spatial setting as an intermediate step in the reproduction process. This requirement makes the number and arrangement of empty sites important to the formation of space-time patterns. We study the density of empty sites in a stochastic predator-prey model in which the species compete in a cyclic way in two dimensions. In some cases systems of this type quickly form domains of neutral species after which all predation, and therefore, reproduction occur near the interface of competing domains. Using Monte Carlo simulations we investigate the relationship of this density of empty sites to the time-dependent domain length. We further explore the dynamics by introducing perturbations to the interaction rates of the system after which we measure the perturbed density, i.e. the response of empty sites, as the system relaxes. A dynamical scaling behavior is observed in the response of empty sites.

Michel Pleimling
Virginia Tech

Date submitted: 10 Nov 2014   Electronic form version 1.4