Michael R Kelly* (mkelly14@utk.edu). *Optimal fishery harvesting on a nonlinear parabolic PDE in a heterogeneous spatial domain. Preliminary report.

The overexploitation of fisheries has called for an improved understanding of spatiotemporal dynamics of resource stocks. One way to protect fish populations from overexploitation is the inclusion of no-take marine reserves, which prohibit the removal of natural resources from an area of the ocean. There has been previous work done on this subject, which sought after yield maximizing strategies without imposing these no-take reserves into the model. The question of whether the implementation of alternative boundary conditions, deemed more favorable to the fish stock, on a heterogeneous domain could produce an alternative optimal harvesting strategy. We use the tool of optimal control to investigate harvesting strategies for maximizing yield of a fish population in a heterogeneous, finite domain. We determine whether these solutions include no-take marine reserves as part of the optimal solution. The fishery stock is modeled using a nonlinear, parabolic partial differential equation with logistic growth, movement by diffusion and advection, and with Robin boundary conditions. The objective is to find the harvest rate that maximizes the discounted yield. Optimal harvesting strategies are found numerically. (Received January 28, 2014)