SIAM/APPLIED AND NUMERICAL ANALYSIS SEMINAR

Date: February 17, 2021

Speaker: Summer Atkins

Title: Regularization of Singular Control Problems that Arise in Mathematical Biology

Abstract: Optimal control problems applied to biological models tend to incorporate an objective functional that increases quadratically with the control. However, the principle of parsimony would lead one to assume that the objective functional should increase linearly with the control rate. Problems of this form tend to have a solution that contains a singular arc, which can be difficult to solve both explicitly and numerically. Often the numerical solution obtained will exhibit numerical artifacts that are oscillatory. In this talk, we consider a method of regularizing these oscillations by adding a total variation term to the objective functional of the problem. We then use a nonlinear optimization solver called PASA to solve three biological control problems in which regularization is needed.