

# ACMS Applied Math Seminar

Xinyue Zhao

University of Notre Dame

Thursday, November 14, 2019

154 Hurley Hall

3:30 - 4:30 P.M.



## **A Free Boundary Tumor Growth Model with Time Delay**

Being a leading cause of death, tumor is one of the most important health problems facing the whole world. While there is a lot of work on the tumor growth models, only a few of them included time delay; and nearly in all the literature, only the radially symmetric case was considered with a time delay. In this talk, I will present a non-radially symmetric tumor growth model with a time delay in cell proliferation. The time delay represents the time taken for cells to undergo replication (approximately 24 hours). The model is a coupled system of an elliptic equation, a parabolic equation and an ordinary differential equation. It incorporates the cell location under the presence of time delay, with the tumor boundary as a free boundary. The inclusion of a small time delay makes the system non-local, which produces technical difficulties for the PDE estimates. I will discuss the stability and bifurcation results we obtained concerning this model. Through stability analysis, the result indicates that tumor with large aggressiveness parameter would trigger instability, which is biologically reasonable.

The Department of Applied and Computational  
Mathematics and Statistics

Please visit [acms.nd.edu](http://acms.nd.edu) to view the full list of speakers.