

DEPARTMENT OF MATHEMATICS AND STATISTICS  
MISSISSIPPI STATE UNIVERSITY

# COLLOQUIUM

## Mathematical Modeling of Dynamic Instability of two Biological Systems: Microtubules and Vascular Networks

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Monday, February 9 at 3:30 pm

Allen 14

**Abstract.** In this talk, I will discuss the mathematical modeling and stability analysis of two important biological phenomena: formation of Microtubules as a polymer structure common to most eukaryotic cells and development of proto-blood-vessels from initially Endothelial Cells. In the first part of the talk, after introducing nonequilibrium systems driven by additive or multiplicative dichotomous Markov noise, I will discuss existence and stability of steady states of a reaction convection diffusion equation modeling microtubule formation. In the second part, I will review the physical mechanisms of vascular network formation using Glazier and Graner's Cellular Potts Model (CPM) for chemotactically migrating cells. I will show the patterning instabilities and simulations of the network in two and three-dimensions.

Dr. Yarahmadian is a candidate for a position in our department. There will be a reception for him in Allen 467 at 4:30 pm following his talk.