Mathematical Autobiography

Xue Gong

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I grew up in Suzhou, a city known for its canals, bridges and classical gardens in China. I graduated from Donghua University in China in 2010 and obtained my Bachelor's degree in Mathematics and Applied Mathematics (Mathematical Finance). After this, I decided to come to Ohio University for graduate studies.

I am currently a sixth year Ph.D. student in mathematics at Ohio University. My research area is Applied Dynamical Systems, at the intersection with Biology. I have used dynamical systems, ordinary differential equations, computational mathematics and statistical methods in my research work to study emergent properties of complex systems.

Under the supervision of my advisor, Dr. Young, I have worked on an ODE model of the yeast cell division cycle. In this model, cells are considered to be coupled oscillators with the cell cycle of each cell as one oscillator. Based on the previous work of Dr. Young and his collaborators, we studied a modified model where a small delay effect on the coupling mechanism is introduced. We compared the stability result with that of the model with no delay effect. Apart from this, we have also studied the stochastic version of this model, where different types of noise are introduced into the system. We studied how strong the coupling mechanism is in the model for the clustering of cells to exist under various dispersion mechanisms.

I have also worked with Dr. Afraimovich and Dr. Rabinovich on a high-dimensional ODE model in sequential memory and attention focusing. The model we studied is in the form of generalized Lotka-Volterra equations. The mathematical image of this is a heteroclinic chain of heteroclinic cycles, which is called the multimodality heteroclinic network. We studied the robustness of this network and its symbolic complexity function.

Currently, I am working with Dr. Martin Mohlenkamp and Dr. Todd Young on problems in tensor approximation using the tools in dynamical systems. We have already known that when approximating a rank 2 tensor with a rank 1 tensor, there is an invariant symmetric set under the gradient flow where local minimum can be achieved. So we want to study whether there are any local minima outside of this symmetric set. This can help us understand the gradient flow better. I am participating in this project because it is very interesting.

As for the future goals, I am planning to obtain the doctorate degree in 2016 and then pursue a career in both teaching and research.

According to the VARK questionnaire, I have a multimodal learning preference. My scores are: Visual 8; Aural 4; Read/Write 9; Kinesthetic 9.