



**Department of Mathematics**

# Colloquium

Junping Shi

College of William and Mary

## *Uniqueness of Positive Solution to Some Coupled Cooperative Variational Elliptic Systems*

***Abstract:*** Systems of nonlinear elliptic type partial differential equations arise from many models in mathematical physics or other mathematical models. While the existence of positive solutions to such elliptic systems has been obtained through various variational or other methods, the uniqueness or exact multiplicity of solutions have been mostly open. We introduce a rather general approach of proving the uniqueness of positive solution to the system in one dimensional space. The key ingredient of the proof is the oscillatory behavior of solutions to linearized equations for cooperative semilinear elliptic systems of two equations, and it is shown that the stability of the positive solutions for such semilinear system is closely related to the oscillatory behavior. We use this general approach to prove the uniqueness of positive solution to two Schrodinger type nonlinear systems. This is a joint work with Yulian An (Shanghai Institute of Technology) and Jann-Long Chern (National Central University).

***About the Speaker:*** Junping Shi is the Margaret Hamilton Professor of Mathematics in College of William and Mary. He studied mathematics in Nankai University of China, and he obtained PhD in mathematics from Brigham Young University in 1998. His research areas include nonlinear elliptic and parabolic equations, bifurcation theory and mathematical biology, and his research is supported by the mathematical biology program in National Science Foundation. He is an associate editor of 4 journals in analysis and differential equations. He has received Plumeri Awards for Faculty Excellence (2013), Arts and Sciences Distinguished Associate Professor (2010), and Phi Beta Kappa Faculty Award for the Advancement of Scholarship (2008) in College of William and Mary. He is the director of William and Mary NSF EXTREEMS-QED program.

**Tuesday October 17, 2017**

**11:00 - 12:00 PM in SQ103**

