Workshop on Differential Equations

April 28, 2018

Organizers:

Yachun Li (Shanghai Jiao Tong University)

Weike Wang (Shanghai Jiao Tong University)

Tong Yang (City University of Hong Kong)

Plenary Speakers:

HermanoFrid (IMPA, Brazil)

Kening Lu (Brigham Young University, USAand Sichuan University, China)

Chunlai Mu (Chongqing University, China)

Sponsors:

National Natural Science Foundation of China,

Shanghai Jiao Tong University

Schedule:

09:00-12:00, group discussion

14:00-18:00, plenary lectures, Middle Lecture Room, Math Building

14:00-15:00(Chair: Tong Yang)
SRB measures for Partial Differential Equations (Kening Lu)

15:00-15:20 Tea Break

15:20-16:20 (Chair: Yachun Li)
An extension of Bakhvalov's theorem for systems of conservation laws with damping (HermanoFrid)

16:20-16:40 Tea Break

16:40-17:40 (Chair: Weike Wang)
Stabilization in a higher-dimensional attraction-repulsion chemotaxis system if repulsion dominates over attraction (Chunlai Mu)

Abstracts:

An extension of Bakhvalov's theorem for systems of conservation laws with damping

HermanoFrid (Instituto Nacional de Matemtica Pura Aplicada, Brazil)

For 2X2 systems of conservation laws satisfying Bakhvalov conditions, we present a class of damping terms that still yield the existence of global solutions with periodic initial data of possibly large bounded total variation per period. We also address the question of the decay of the periodic solution. As applications we consider the systems of isentropic gas dynamics, with pressure obeying a γ-law, for the physical range $\gamma \geq 1$, and also for the ``non-physical'' range $0 < \gamma < 1$, both in the classical Lagrangian and Eulerian formulation, and in the relativistic setting. We give complete details for the case $\gamma = 1$, and also analyze the general case when $|\gamma - 1|$ is small. Further, our main result also establishes the decay of the periodic solution.

SRB measures for Partial Differential Equations

Kening Lu(Brigham Young University, USA and Sichuan University, China)

In this talk, I will report recent work on the existence of SRB measures and their implication for infinite dimensional dynamical systems. As an example, I will show the existence of strange attractors with SRB measures for parabolic PDEs undergoing Hopf bifurcations driven by a periodic forcing with applications to the Brusselator.

Stabilization in a higher-dimensional attraction-repulsion chemotaxis system if repulsion dominates over attraction

Chunlai Mu (Chongqing University, China)

The long-time behavior of solutions to an attraction-repulsion chemotaxis system is considered in this paper in a bounded domain under zero-flux boundary conditions if repulsion dominates over attraction. It is known that in higher dimensions and under the assumption that repulsion balances/cancels attraction, for any suitably regular initial data all solutions of this problem will be global and bounded. The present work further shows that if the degradation rate of a repulsive signal is smaller thanthe attractive one or the repulsion is suitable strong, this global solutions converge to the steady state for arbitrarily large initial data. To the best of our knowledge, theseare the first results on the large time of large-data solutions in a higher-dimensional attraction-repulsion chemotaxis system.