



## 2024 年微分方程与动力系统研讨会 I

2024 年 7 月 1 日 (数学科学学院西楼 111 报告厅)		
时间	报告人及报告题目	主持人
09:00—10:00	Periodic dynamics of a mosquito population suppression model based on <i>Wolbachia</i> -infected males 庾建设 (广州大学)	刘秀湘
10:00—11:00	Propagation dynamics of reaction and diffusion equations in a time-heterogeneous shifting environment 赵晓强 (纽芬兰纪念大学)	杨启贵
11:00—12:00	Threshold dynamics of a time-periodic nonlocal dispersal SIS epidemic model with Neumann boundary conditions 王其如 (中山大学)	黄锐
12:00—14:30	午餐	
14:30—17:30	自由讨论	



Periodic dynamics of a mosquito population suppression model based on  
*Wolbachia*-infected males

庾建设, 广州大学

**报告摘要:** In this talk, we study a mosquito population suppression model, consisting of two sub-models switching each other, based on *Wolbachia*-infected mosquitoes. Under the assumptions that the releases of *Wolbachia*-infected males are impulsive and periodic and the waiting period between two consecutive releases is not less than the sexually active lifespan of *Wolbachia*-infected males, we give a fairly complete description on the periodic dynamics of the model including the nonexistence, uniqueness and exact-two of periodic solutions. We also analyze the asymptotic stability of each periodic solution and each constant equilibrium in detail. This is a joint work with my Ph.D students Yufeng Wang, Yining Chen and Professor Bo Zheng.

**专家简介:** 庾建设, 博士, 教授, 博士生导师, 国家杰出基金获得者, 国家有突出贡献的中青年专家, 全国模范教师, 国家“百千万人才工程”第一层次、第二层次人选, 教育部跨世纪优秀人才, 享受政府特殊津贴专家, 广州大学应用数学研究中心主任。庾建设教授长期从事微分方程动力系统、差分方程及生物数学模型的理论与应用研究, 先后主持国家自然科学基金项目 10 余项, 其中重点项目 4 项, 数学交叉研究平台项目 2 项; 曾获国家级教学成果一等奖 1 项, 省部级科技成果、教学成果一等奖 4 项。近十年来, 致力于应用数学的理论研究及其在基因表达、蚊媒传染疾病防控等方面的应用, 已在 Nature、PLoS Computational Biology、J. Diff. Equas.、J. Dyna. Diff. Equas.、SIAM J. Math. Anal.、SIAM J. Appl. Math.、Journal of Math. Biol.、J. Theo. Biol.、Math. Biosciences、Bull. Math. Biol. 等重要数学、应用数学国际刊物发表论文 100 多篇, 入选全球前 2% 顶尖科学家榜单。



Propagation dynamics of reaction and diffusion equations in a time-heterogeneous  
shifting environment

赵晓强, 纽芬兰纪念大学

**报告摘要:** In this talk, I will report our recent research on the propagation dynamics of a large class of time and space heterogeneous reaction-diffusion equations in a shifting environment. Let  $c^*$  be the spreading speed of the associated limiting equation. Under the assumption that the shifting speed admits a uniform mean  $c$ , we show that the solutions with compactly supported initial data go to zero eventually when  $c \leq -c^*$ , the leftward spreading speed is  $-c^*$  when  $c > -c^*$ , and the rightward spreading speed is  $c$  and  $c^*$  when  $c \in (-c^*, c^*)$  and  $c \geq c^*$ , respectively. We also establish the existence, uniqueness and nonexistence of the forced traveling wave in terms of the sign of  $c - c^*$ .

**专家简介:** 赵晓强, 加拿大纽芬兰纪念大学数学与统计系教授, 该校 University Research Professorship 荣誉获得者。赵教授先后于 1983 年和 1986 年在西北大学



数学系获学士和硕士学位，1990年在中国科学院应用数学研究所获博士学位。

赵教授长期从事动力系统、微分方程和生物数学相关领域的研究，在单调动力学、一致持久性、行波解和渐近传播速度、主特征值、基本再生数的理论及应用等方面的系列工作受到同行的广泛关注和引用。迄今为止，他已在“Comm. Pure Appl. Math.、J. Eur. Math. Soc.、J. Reine Angew. Math.、J. Math. Pures Appl.、Trans. Amer. Math. Soc.、SIAM J. Math. Anal.”等国际知名期刊上发表论文180余篇，并在Springer出版专著“Dynamical Systems in Population Biology”。赵教授个人主页：<https://www.math.mun.ca/~zhao/>

### Threshold dynamics of a time-periodic nonlocal dispersal SIS epidemic model with Neumann boundary conditions

王其如，中山大学

**报告摘要：** In this talk, we study a time-periodic nonlocal dispersal susceptible-infected-susceptible epidemic model with Neumann boundary conditions, where the total population number is constant. First, we investigate limiting profile of the spectral bound for a time-periodic nonlocal dispersal operator, and then obtain asymptotic behavior of the basic reproduction ratio of the model as the dispersal rates go to zero and infinity, respectively. Next, we establish the existence, uniqueness and stability of steady states of the model in terms of the basic reproduction ratio. Finally, we discuss the impacts of small and large diffusion rates of the susceptible and infectious populations on the persistence and extinction of the disease.

**专家简介：** 王其如，中山大学数学学院教授、博士研究生导师，中国工业与应用数学学会理事、数学与国防创新委员会委员、数学模型专业委员会委员，广东省和广州工业与应用数学学会理事长、党支部书记。从事微分方程与动力系统、数学建模等方面的研究及应用，主持完成国家自然科学基金面上项目4项、在研1项，在国内外学术期刊 J. Differential Equations、Adv. Nonlinear Anal.、J. Nonlinear Sci.、Nonlinear Anal. Real World Appl.、Discrete Contin. Dyn. Syst.、Fract. Calc. Appl. Anal.、中国科学数学（中、英文版）等发表相关学术论文140余篇。是德国《数学文摘》和美国《数学评论》的评论员等。