

数学与系统科学研究院

计算数学所学术报告

报告人: **Associate Prof. Ruili Zhang**

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报告题目:

**Classical Instabilities of Conservative  
Systems are the Results of  
Parity-Time Symmetry Breaking**

邀请人: 唐贻发 研究员

报告时间: **2019 年 4 月 24 日 (周三)**

**上午 10:00-11:00**

报告地点: **数学院南楼七层**

**702 教室**

## **Abstract:**

We show that the governing equations of the classical two-fluid interaction and the incompressible fluid system are PT-symmetric, and the well-known Kelvin-Helmholtz instability is the result of spontaneous PT-symmetry breaking. Specifically, it is shown that the boundaries between the stable and unstable regions are locations for Krein collisions between eigenmodes with different Krein signatures. In terms of physics, this rigorously implies that the system is destabilized when a positive-action mode resonates with a negative-action mode, and that this is the only mechanism by which the system can be destabilized. It is anticipated that this physical mechanism of destabilization is valid for other collective instabilities in conservative systems in plasma physics, accelerator physics, and fluid dynamics systems.

### **References:**

- [1] R. Zhang, H. Qin, R. C. Davidson, J. Liu, and J. Xiao, *Physics of Plasmas* 23, 072111 (2016).
- [2] H. Qin, R. Zhang, A. S. Glasser, et al. Kelvin-Helmholtz instability is the result of parity-time symmetry breaking[J]. *Physics of Plasmas*, 2019, 26(3): 032102.

**欢迎大家参加！**