

数学与系统科学研究院

计算数学所学术报告

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报告题目:

**On the structure of the two-stream
instability–complex G-Hamiltonian
structure and Krein collisions between
positive- and negative-action modes**

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报告时间: **2017年2月16日(周四)**

下午 15:30-16:30

报告地点: **数学院南楼九层**

902 教室

Abstract:

The two-stream instability is probably the most important elementary example of collective instabilities in plasma physics and beam-plasma systems. For a warm plasma with two charged particle species, the instability diagram of the two-stream instability based on a 1D warm-fluid model exhibits an interesting band structure that has not been explained. We show that the band structure for this instability is the consequence of the Hamiltonian nature of the warm two-fluid system. Interestingly, the Hamiltonian nature manifests as a complex G-Hamiltonian structure in wavenumber space, which directly determines the instability diagram. 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, which admit infinite-dimensional Hamiltonian structures.

欢迎大家参加！