

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:

**Modelling the Thermochemical Ablation  
and Blowing Behaviors of Novel Silicon  
Based Composites as Thermal  
Structural/Functional Integrated Materials**

邀请人: 曹礼群 研究员

报告时间: 2017 年 4 月 28 日 (周五)

上午 9:00-10:20

报告地点: 数学院南楼七层

714 教室

## **Abstract:**

**Silicon nitride/silica ( $\text{Si}_3\text{N}_4/\text{SiO}_2$ ) composite is one of the most prospective candidates for thermal protection system of spacecraft. In the presentation, some experimental results from post arc-jet tunnel tests are demonstrated based on materials microstructure analysis. The surface and cross-section microstructures of the post-test specimen are quantitatively characterized respectively. A model to predict the scale thickness of surface liquid oxides is achieved based on the mechanism of surface chemical reactions and mass transfer. The computational method considering inner chemical reactions and mass loss owing to blowing is developed. Furthermore, the surface recession rate and oxides layer thickness of the composite under arc-jet tunnel simulated environments is calculated by the developed method. The theoretical results agreed well with on-ground arc-jet tunnel tests. The results can give a good reference to estimate the thermal response of materials under the similar flight trajectories. Finally, an overview of future development of modelling the thermal protection materials is presented.**

**欢迎大家参加！**