

数学与系统科学研究院  
计算数学所网络学术报告

**报告人: Assistant Prof. Shihua Gong**

( *Chinese University of Hong Kong (Shenzhen)* )

**报告题目:**

**Convergence of Restricted Additive Schwarz method with impedance transmission conditions for discretized Helmholtz problems**

**邀请人: 张晨松 副研究员**

**报告时间: 2021 年 12 月 22 日(周三)**

**晚上 19:30-21:00**

**报告工具: 腾讯会议(ID: 988 7371 5026)**

会议链接:

<https://meeting.tencent.com/dm/jOtuYVFJIHeR>

## Abstract:

The Restricted Additive Schwarz method with impedance transmission conditions, also known as the Optimised Restricted Additive Schwarz (ORAS) method, is a simple overlapping one-level parallel domain decomposition method. It is implemented in PETSc and FreeFEM++ and has been successfully used as an iterative solver and a preconditioner for wave propagation problems. However, there remains limited rigorous convergence analysis of this method. This talk will revisit some background of the Helmholtz equation and some standard convergence theory for the iterative methods. Then I will present a novel convergence analysis for ORAS based on "power contractivity". The analysis starts by showing that ORAS is an unconventional finite element approximation of a classical parallel iterative Schwarz method, formulated at the PDE (non-discrete) level. This non-discrete Schwarz method was recently analyzed in [Gong, Gander, Graham, Lafontaine, Spence, arXiv 2106.05218]. Using a novel weighted finite-element error estimate for Helmholtz problems, we show that ORAS inherits the convergence properties of the Schwarz method, independent of polynomial order.

## 报告人简介:

Gong is an Assistant Professor in Mathematics at the Chinese University of Hong Kong, Shenzhen. He obtained his bachelor's degree from Sun Yat-sen University in 2013 and a Ph.D. degree in Computational Mathematics from Peking University in 2018. Before joining CUHK-Shenzhen, he worked as a postdoctoral scholar at Pennsylvania State University (2018-2019) and a research associate at the University of Bath (2019-2021). His research interests include scientific computing and numerical analysis, mainly focusing on finite element, domain decomposition methods, and preconditioning techniques.

**欢迎大家参加!**