



## 复旦大学数学科学学院 数学综合报告会

报告题目：超图的同调群和 Hodge 分解 (The Embedded Homology of Hypergraphs and Hodge Decompositions)

报告人：任世全 (清华大学)

时间：2020-12-23 星期三 9:00-10:00

地点：腾讯会议 ID：209 238 724，密码：24680

### 报告摘要：

Hypergraphs are mathematical models for many problems in data sciences. In recent decades, the topological properties of hypergraphs have been studied and various kinds of (co)homologies have been constructed. By generalising the usual homology of simplicial complexes, we define the embedded homology of hypergraphs as well as the persistent embedded homology of sequences of hypergraphs. As a generalisation of the Mayer-Vietoris sequence for the homology of simplicial complexes, we give a Mayer-Vietoris sequence for the embedded homology of hypergraphs. We generalize the weighted Laplacians of weighted simplicial complexes to weighted Laplacians of weighted hypergraphs. We study the relations between the weighted Laplacians and the weighted embedded homology of weighted hypergraphs. We generalize the Hodge decompositions of weighted simplicial complexes to Hodge decompositions of weighted hypergraphs. Moreover, as a complement for the Hodge decompositions, we give some results for the nonzero eigenvalues of the weighted Laplacians of weighted hypergraphs.

非线性数学模型与方法教育部重点实验室  
中法应用数学国际联合实验室  
上海市现代应用数学重点实验室  
复旦大学数学研究所