



華東師範大學 | 数学科学学院
School of Mathematical Sciences, East China Normal University

图论与优化研讨会

程 序 册

主办单位：华东师范大学数学科学学院
数学与工程应用教育部重点实验室

2025 年 11 月 21 日 – 2025 年 11 月 22 日



2025年华东师范大学图论与优化研讨会

2025 年 11 月 21 日 – 2025 年 11 月 22 日，上海

为集中展示图论与优化领域的最新研究进展与应用成果，进一步推动组合数学、运筹学及相关方向的学术交流与合作，由华东师范大学数学科学学院主办的 2025 图论与优化学术研讨会将于 2025 年 11 月 21 日-2025 年 11 月 23 日在华东师范大学闵行校区数学楼举行。

本次研讨会将聚焦图论与优化前沿，分享国际最新研究成果，探讨领域内热点与挑战，旨在搭建高水平的学术对话平台，促进同行间的深度合作。我们诚挚地邀请您拨冗参加本次研讨会。

会议时间： 2025 年 11 月 21 日 – 2025 年 11 月 22 日

会议地点： 华东师范大学闵行校区数学楼 102 报告厅

会议组织委员会主任： 吕长虹

会议组织委员会委员 (按姓氏拼音排序)： 杜若霞、徐孜立、叶青杰、袁龙图、詹兴致

会议联系人： 袁龙图 (ltyuan@math.ecnu.edu.cn)、叶青杰 (qjye@math.ecnu.edu.cn)

日程安排

11 月 21 日			
会议地点：华东师范大学闵行校区数学楼 102 报告厅			
时间	报告人	题目	主持人
15:00–15:40	宁博	Localized and weighted versions of extremal problems	袁龙图
15:40–16:20	彭兴	The cops-and-robbers game	
16:20–17:00	汪彦	Tight bounds for judicious 3-partitions of graphs	
17:30–19:30	晚餐地点：宝龙艺悦酒店		
11 月 22 日			
会议地点：华东师范大学闵行校区数学楼 102 报告厅			
时间	报告人	题目	主持人
8:30–9:10	康丽英	Spectral extremal problems for degenerate graphs	叶青杰
9:10–9:50	余炜	Packing short paths into bounded degree graphs	
9:50–10:10	合影与茶歇		
10:10–10:50	张安	An improved local search algorithm for the k -star partition problem	徐孜立
10:50–11:40	张宇昊	Online flow time minimization: Tight bounds for non-preemptive algorithms	
12:00–13:00	午餐地点：华东师范大学闵行校区夏雨厅		

报告摘要

Spectral extremal problems for degenerate graphs

康丽英

上海大学

摘要: A family of graphs is called degenerate if it contains at least one bipartite graph. In this paper, we investigate the spectral extremal problems for a degenerate family of graphs $\mathcal{F}$. By employing covering and independent covering of graphs, we establish a spectral stability result for $\mathcal{F}$. Using this stability result, we prove two general theorems that characterize spectral extremal graphs for a broad class of graph families $\mathcal{F}$, yielding several new findings as well as reaffirming some known results. Furthermore, we establish the correlation between extremal graphs and spectral extremal graphs for $\mathcal{F}$. In particular, we determine the unique spectral extremal graph when $\mathcal{F} = \{M_{s+1}, F\}$, $\mathcal{F} = \{K_{r+1}, P_{k+1}\}$, $\mathcal{F} = \{C_{\geq k}, K_{r+1}\}$ or $\mathcal{F} = \{C_{\geq k}, M_{s+1}\}$, where M_{s+1} denotes a matching of size $s+1$, F is a color-critical graph, and $C_{\geq k}$ represents the set of cycles of length at least k .

报告人简介: 康丽英, 上海大学数学系教授. 曾获得“上海市三八红旗手”、“上海市曙光学者”称号, 曾获得“上海大学吴兴华数学奖”. 研究兴趣包括极值图论、图和超图的谱. 在 *Journal of Combinatorial Theory, Series B*、*SIAM Discrete Mathematics*、*Journal of Graph Theory*、*European Journal of Combinatorics* 等重要学术期刊上发表学术论文 180 余篇. 主持国家自然科学基金项目 6 项, 参加国家自然科学基金重点项目 1 项, 参加重大研究计划 1 项. 现担任中国运筹学会常务理事、中国工业与应用数学学会组合图论专业委员会秘书长、中国数学会组合图论分会理事. 担任国际期刊 *Discrete Mathematics, Algorithms and Applications*、*Journal of the Operations Research Society of China*、*Communications on Applied Mathematics and Computation* 和国内期刊《运筹学学报》编委.

Localized and weighted versions of extremal problems

宁博

南开大学

摘要: Malec and Tompkins (EUTC, 2023) considered the localized versions of Turán-type problems, and proved a localized theorem on Erdős-Gallai Theorem on paths. Zhao and Zhang (JGT, 2025) gave a long proof of a localized version of Erdős-Gallai Theorem on cycles.

In this paper, we consider several types of generalization of Turán-type problems, that is, localized versions, weighted versions, and generalized Turán-type problems, and their connectedness. We mainly present very short proofs for recent results of Malec-Tompkins and Zhao-Zhang, respectively. We also present a short proof of a weighted localized Turán-type theorem on paths, which uses Small Path Double Cover Conjecture, which was proposed by Bondy (JGT, 1990) and confirmed by Hao Li (JGT, 1990). We present localized versions of Balister-Bollobás-Riordan-Schelp Theorem (JCTB, 2003) on paths and Erdős-Gallai Theorem on matchings, and show that our first localized result implies Balister-Bollobás-Riordan-Schelp Theorem, Erdős-Gallai Theorem, and Malec-Tompkins Theorem on paths. We present generalized Turán-style generalizations of the Malec-Tompkins Theorem, and discuss the relationship between some previous theorems in different motivations. Lastly, we also give a brief introduction to localized versions of Turán theorem, its weighted versions and related Ramsey-Turan type problems.

报告人简介: 宁博, 南开大学教授、博士生导师、南开大学百名青年学科带头人. 主要研究兴趣是极值图论、结构图论和谱图论. 在图论领域主流期刊发表 (含接收) 论文 60 余篇, 综述论文 1 篇. 代表性成果是和李斌龙合作解决了 Woodall 在 1975 年提出的长圈猜想, 该猜想被 JCTB 前主编 Bondy 和 Murty 列为图论领域 50 个未解决问题 (问题 7), 收录在经典图论教科书 *Graph Theory with Applications* 的附录中. 曾入选国家高层次青年人才, 主持国家基金项目 4 项. 曾应邀在第 9 届世界华人数学家大会作 45 分钟特邀报告, 并获第 8 届运筹学会青年科技奖和陕西省高等学校优秀研究成果一等奖 (排名第 2).

The cops-and-robbers game

彭兴

安徽大学

摘要: The game of cops and robbers, which is played on the vertices of some fixed graph G . Cops and a robber are allowed to move along the edges of G , and the goal of cops is to capture the robber. The cop number is the minimum number of cops required to win the game. The central question is the Meyniel's conjecture on the cop number of graphs. In this talk, we will survey the progress on the Meyniel's conjecture and mention a number of questions.

报告人简介: 彭兴, 安徽大学数学科学学院教授, 博士生导师, 主要研究方向为极值图论和随机图论. 在 *J. Combin. Theory Ser. A*、*J. Combin. Theory Ser. B*、*Random Structures Algorithms* 等杂志发表论文多篇.

Tight bounds for judicious 3-partitions of graphs

汪彦

上海交通大学

摘要: In this talk, we show that every graph with m edges admits a 3-partition such that

$$\max_{1 \leq i \leq 3} e(V_i) \leq \frac{m}{9} + \frac{1}{9}h(m) \quad \text{and} \quad e(V_1, V_2, V_3) \geq \frac{2}{3}m + \frac{1}{3}h(m),$$

where $h(m) = \sqrt{2m + 1/4} - 1/2$. This answers a problem of Bollobás and Scott affirmatively. We also solve several related problems of Bollobás and Scott. All of our results are tight. This is joint work with Peiru Kuang.

报告人简介: 汪彦, 现任上海交通大学数学科学学院副教授. 2017 年博士毕业于美国佐治亚理工学院. 获得国家高层次青年人才, 上海市海外高层次人才计划, 并主持国家重点研发计划青年科学家项目. 研究方向是图论及其应用. 他在 JCTB、JCTA、SIDMA、JGT 等期刊发表论文 20 篇. 其工作包括与其导师郁星星等人合作证明了近四十年的公开问题 Kelmans-Seymour 猜想等.

Packing short paths into bounded degree graphs

余炜

华东理工大学

摘要: Given an undirected graph $G = (V, E)$, the maximum $\{P_i, P_j\}$ -packing problem aims to find a $\{P_i, P_j\}$ -packing, i.e. a set of vertex-disjoint i -paths or j -paths in G , to cover the most vertices. Here a k -path is a subgraph of G isomorphic to P_k which is defined as the simple path with k vertices and $k - 1$ edges. The number of vertices covered by a $\{P_i, P_j\}$ -packing is called its size.

In this paper, given any graph G with maximum bounded degree d and $v(G)$ vertices, we give a complete analysis on the absolute bounds on the size of the maximum $\{P_i, P_j\}$ -packing of G with respect to $v(G)$ for all possible integers i and j with $2 \leq i \leq j \leq 4$. In addition, we refine our analysis to obtain better bounds when G is restricted to $(2,3)$ -regular or cubic graph. These results are achieved by local search algorithms that can generate, in polynomial time, the desired $\{P_i, P_j\}$ -packing of G .

报告人简介: 余炜, 华东理工大学数学学院副教授, 主要研究方向为组合最优化、排序与路线问题、图覆盖与图划分问题等. 中国运筹学会排序分会理事和数学规划分会青年理事、上海市工业与应用数学学会理事. 在运筹优化和算法主流刊物 *Algorithmica*、EJOR、JOGO、JOS、NRL、ORL、*Networks*、AOR、DAM 和算法领域国际会议 ISAAC、COCOON、COCOA 等发表论文 40 余篇. 主持国家自然科学基金面上项目和青年基金项目各 1 项、上海市自然科学基金项目 2 项.

An improved local search algorithm for the k -star partition problem

张安

杭州电子科技大学

摘要: Given an undirected graph $G = (V, E)$, the k -star partition problem is to find a minimum number of vertex-disjoint k -stars of G that cover all vertices in V . The problem is NP-hard for any $k \geq 3$, and there have been several approximation algorithms via local search. By introducing a set of local improvement operations on small stars, we address an $O(|V|^{10})$ -time algorithm. Through a new amortization scheme, we show that our algorithm can achieve approximation ratios of $52/29$ and $k/2 - (k^2 - k)/(4k^2 - 2k + 1)$ for $k = 4$ and $k \geq 5$ respectively. They both improve the best known results.

报告人简介: 张安, 杭州电子科技大学教授、博士生导师. 2009 年获得浙江大学博士学位. 现为中国运筹学会理事、中国运筹学会排序分会常务理事. 主要研究组合优化理论与算法. 主持多项国家自然科学基金和浙江省自然科学基金项目. 在 *Algorithmica*, *Inf. Comput.*, *Eur. J. Oper. Res.*, *Discrete Appl. Math.*, *Theor. Comput. Sci.*, 《中国运筹学会会刊》等国内外期刊上发表 40 余篇论文. 研究成果曾获得浙江省高等学校科研成果奖二等奖.

Online flow time minimization: Tight bounds for non-preemptive algorithms

张宇昊

上海交通大学

摘要: This paper studies the classical online scheduling problem of minimizing total flow time for n jobs on m identical machines. Prior work often cites the $\Omega(n)$ lower bound of Kellerer, Tautenhahn, and Woeginger (SICOMP 1999) for non-preemptive algorithms to argue for the necessity of preemption or resource augmentation, which shows the trivial $O(n)$ -competitive greedy algorithm is tight. However, this lower bound applies only to *deterministic* algorithms in the *single-machine* case, leaving several fundamental questions unanswered. Can randomness help in the non-preemptive setting, and what is the optimal online deterministic algorithm when $m \geq 2$? We resolve both questions. We present a polynomial-time randomized algorithm with competitive ratio $\Theta(\sqrt{n/m})$ and prove a matching randomized lower bound, settling the randomized non-preemptive setting for every m . This also improves the best-known offline approximation ratio from $O(\sqrt{n/m} \log(n/m))$ to $O(\sqrt{n/m})$. On the deterministic side, we present a deterministic non-preemptive algorithm with competitive ratio $O(n/m^2 + \sqrt{n/m} \log m)$ and prove a nearly matching lower bound of $\Omega(n/m^2 + \sqrt{n/m})$.

Our framework also extends to the *kill-and-restart* model. We reveal a sharp transition in the competitive ratio of deterministic algorithms under this model: we design an asymptotically optimal algorithm with the tight competitive ratio of $O(\sqrt{n/m})$ for $m \geq 2$, while establishing an $\Omega(n/\log n)$ lower bound for $m = 1$. Moreover, we show that allowing randomization provides no further advantage, as the lower bound coincides with that of the non-preemptive setting.

While our main results assume prior knowledge of n , we also investigate the setting where n is unknown. We show that the kill-and-restart capability is powerful enough to break the $O(n)$ barrier when $m \geq 2$ even without knowing n . Conversely, we prove that randomization alone is insufficient, showing that no randomized algorithm can achieve a competitive ratio of $o(n)$ without prior knowledge of n .

报告人简介: 张宇昊, 上海交通大学长聘教轨副教授, 国家海外高层次引进青年人才. 博士毕业于香港大学, 本科毕业于浙江大学. 研究方向为理论计算机, 包括在线算法设计, 近似算法设计等. 论文发表于理论计算机顶级会议期刊, 如 STOC, FOCS, SODA, JACM, SICOMP. 曾主持国自然青年基金一项, 国自然面上基金一项, 获得中国运筹学会青年科技奖提名奖.

华东师范大学数学科学学院简介

华东师范大学的数学学科具有悠久的历史 and 广泛影响力，是学校的传统优势学科，在教育部最新一轮学科评估中取得优秀成绩。学院拥有数学学科一级博士点和数学教育博士点，数学博士后流动站，国家理科基础科学人才培养和科学研究基地，“数学与工程应用”教育部重点实验室，上海市核心数学与实践重点实验室，上海市首批“海外高层次人才创新创业基地”和若干个数学专门研究中心。

目前，数学科学学院拥有一支以多位国际著名数学家、数学教育家为领军人物，以中青年骨干数学家为主体的科研、教学队伍，包括 1 位国际数学家大会 (ICM) 45 分钟报告者，8 位国家级高层次人才计划入选者，9 位国家级高层次青年人才计划入选者。

学院研究方向齐全、科研实力雄厚，近年来学院教师获得教育部自然科学奖二等奖、上海市科技进步特等奖、科学探索奖、萧树铁应用数学奖、保罗厄多斯奖等重要奖项；承担国家重点研发计划项目、国家自然科学基金重点项目、新基石研究员项目、上海市“科技创新行动计划”以及华为、上港集团、唐山港、中交信科等企业委托项目。

数学与工程应用教育部重点实验室简介

数学与工程应用教育部重点实验室聚焦智慧交通工程和近海与生态工程中的数学需求展开理论和应用研究，以问题为导向，落地应用为目标，开展问题驱动的数学研究和数学应用，深入研究问题背后的数学理论以期更广泛的应用。实验室依托上海区位优势，服务国家和上海地区区域建设发展需求。

实验室整合华东师范大学代数研究中心、偏微分方程研究中心、几何分析研究中心、应用数学与交叉中心等校级研究平台，凝聚重点发展方向，精准对接国家战略，提升产学研协同创新能力和承接国家和地方重大重点项目的能力。在基础研究方面，注重聚焦具有应用前景的前沿基础问题，用基础数学提供数学应用的颠覆性技术。在应用数学方面，开展以问题驱动的应用数学研究，为国家和地区创新发展提供数学支撑。

交通信息

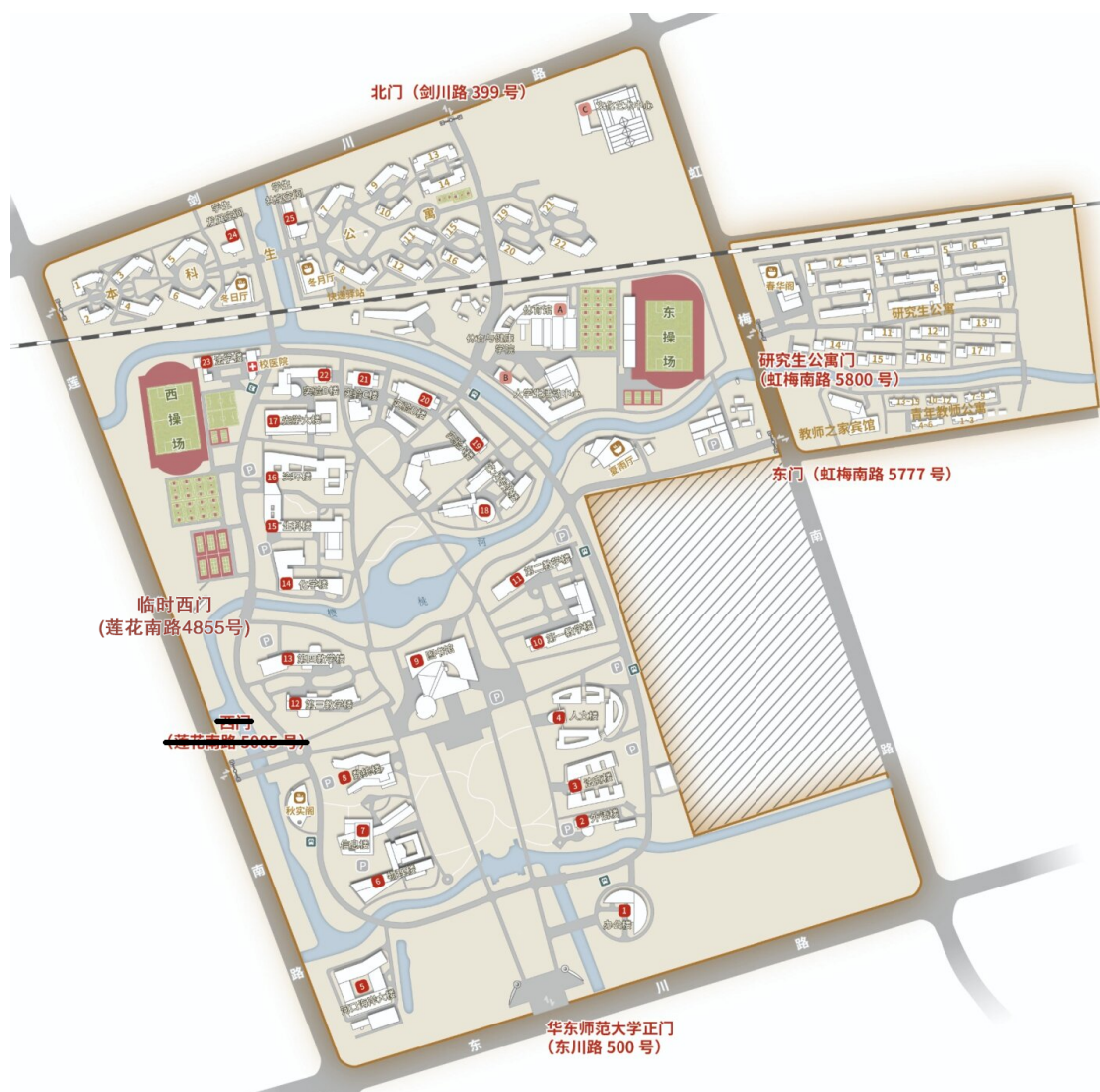


图 1: 华东师范大学闵行校区校园地图

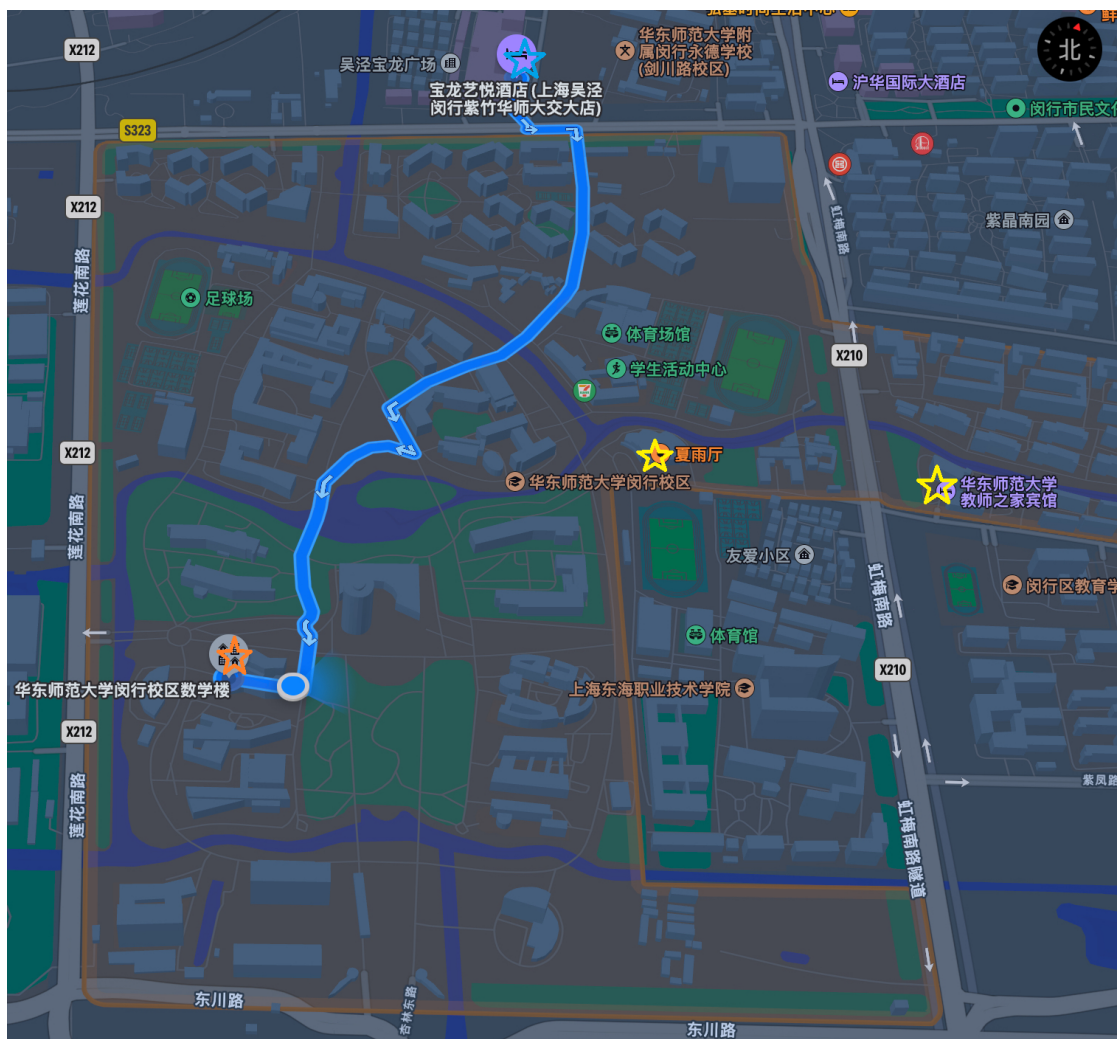


图 2: 从宝龙艺悦酒店到数学楼的建议步行路线



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