

2021 年极值图论及 Ramsey 理论研讨会 通知

为了加强极值图论及 Ramsey 理论的学术交流，促进同行之间的学术研究水平的提升，哈尔滨工程大学、福州大学和同济大学联合于 2021 年 1 月 23 日举办线上“极值图论及 Ramsey 理论研讨会”。

会议的具体事宜如下：

- 1、会议时间：2021 年 1 月 23 日
- 2、报告安排：每位报告人时间为 30 分钟
- 3、腾讯会议 ID：498 236 742

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2021 年 1 月 12 日

会议日程

1 月 23 日	8:30-8:40	嘉宾致辞	范更华
1 月 23 日 上午 腾讯会议 ID: 498 236 742	8:40-9:10	主持: 常安	马杰 (中国科学技术大学) 题目: Extremal problems on cycles in tournaments
	9:10-9:40	主持: 王维凡	侯建锋 (福州大学) 题目: On Max-Bisections of H-free graphs
	9:40-10:10	主持: 许宝刚	鲁红亮 (西安交通大学) 题目: Nearly perfect matchings in uniform hypergraphs
	10:10-10:40	主持: 张运清	胡平 (中山大学) 题目: The inducibility of oriented stars
	10:40-11:10	主持: 张胜贵	王光辉 (山东大学) 题目: Non-linear Hamilton cycles in linear quasi-random hypergraphs
1 月 23 日 中午	休息		
1 月 23 日 下午 腾讯会议 ID: 498 236 742	14:00-14:30	主持: 李学良	彭岳建 (湖南大学) 题目: Tree-star Ramsey number
	14:30-15:00	主持: 闫桂英	陈耀俊 (南京大学) 题目: The Ramsey Numbers of Two Sets of Cycles
	15:00-15:30	主持: 张昭	史永堂 (南开大学) 题目: Anti-Ramsey numbers of graphs and hypergraphs
	15:30-16:00	主持: 陆玫	彭兴 (安徽大学) 题目: The Ramsey number of hypergraph paths
	16:00-16:30	主持: 康丽英	金泽民 (浙江师范大学) 题目: Anti-Ramsey number of matchings
	16:30-17:00	主持: 卜长江	吴河辉 (上海数学中心/复旦大学) 题目: Ramsey type problem for highly-edge-connected monochromatic subgraphs

报告摘要

The Ramsey Numbers of Two Sets of Cycles

陈耀俊 (南京大学)

For two given sets $\mathcal{C}_1$ and $\mathcal{C}_2$ of cycles, the Ramsey number $R(\mathcal{C}_1, \mathcal{C}_2)$ is the smallest integer N such that for any graph G on N vertices, either G contains a cycle from $\mathcal{C}_1$ or its complement contains a cycle from $\mathcal{C}_2$. In this paper, we determine all Ramsey numbers $R(\mathcal{C}_1, \mathcal{C}_2)$, which confirms a conjecture due to Hansson recently, and extends the well known Ramsey numbers for two cycles.

On Max-Bisections of H -free graphs

侯建锋 (福州大学)

A bisection of a graph G is a partition of its vertex set into two sets which differ in size by at most 1, and its size is the number of edges between the two sets. The Max-Bisection problem is to find a bisection of G maximizing its size. There are little results on Max-Bisections of graphs. The talk concerns Max-Bisections of H -free graph for some special graph H .

The inducibility of oriented stars

胡平 (中山大学)

We consider the problem of maximizing the number of induced copies of an oriented star $S_{\{k,l\}}$ in digraphs of given size, where the center of the star has out-degree k and in-degree l . The case $kl=0$ was solved by Huang. Here, we asymptotically solve it for all other oriented stars with at least seven vertices. This is joint work with Jie Ma, Sergey Norin and Hehui Wu.

Anti-Ramsey number of matchings

金泽民 (浙江师范大学)

The anti-Ramsey number $ar(G, H)$ for a graph H in G is defined to be the maximum number of colors in an edge-coloring of G which does not contain any rainbow H . The anti-Ramsey is close related the Turan number of family of graphs obtained from H by deleting an edge. During the recent years, it is an active topic to study the anti-Ramsey problem in some non-complete graphs, for example, planar graphs, bipartite graphs. In this talk, we will present some results of anti-Ramsey number of matchings.

Nearly perfect matchings in uniform hypergraphs

鲁红亮 (西安交通大学)

We prove that, for any integers k, l with $k \geq 3$ and $k/2 \leq l \leq k-1$, there exists a positive real μ such that, for all integers m, n satisfying $\frac{n}{k} - \mu \leq \frac{m}{k-1} \leq \frac{n}{k} - \left(1 - \frac{1}{k}\right) \left\lceil \frac{k-1}{2l-k} \right\rceil$ and n sufficiently large, if H is a k -uniform hypergraph on n vertices and $\delta_1(H) > \binom{n-l}{k-1} - \binom{(n-l)-m}{k-1}$, then H has a matching of size $m+1$. This improves upon an earlier result of Haxel, Person, and Schacht for the range $k/2 \leq l \leq k-1$. In many cases, our result gives tight bound on $\delta_1(H)$ for near perfect matchings (e.g., when $l \geq 2k/3$, $n \equiv r \pmod k$, $0 \leq r < k$, and $r+l \geq k$ we can take $m = \lceil n/k \rceil - 2$). When $k=3$, using an absorbing lemma of Haxel, Person, and Schacht, our proof also implies a result of Kühn, Osthus, and Treglown (and, independently, of Khan) on perfect matchings in 3-uniform hypergraphs.

Extremal problems on cycles in tournaments

马杰 (中国科学技术大学)

Akin to the Erdős-Rademacher problem, Linial and Morgenstern made the following conjecture in tournaments: for any $d \in (0, 1]$, among all n -vertex tournaments with $d \binom{n}{3}$ many 3-cycles, the number of 4-cycles is asymptotically minimized by a special random blow-up of a transitive tournament. Recently, Chan, Grzesik, Král' and Noel introduced spectrum analysis of adjacency matrices of tournaments in this study, and confirmed this for $d \geq 1/36$.

We investigate the analogous problem of minimizing the number of cycles of a given length. We prove that for integers $\ell \not\equiv 2 \pmod 4$, there exists some constant $c_\ell > 0$ such that if $d \geq 1 - c_\ell$, then the number of ℓ -cycles is also asymptotically minimized by the same family of extremal examples for 4-cycles. In doing so, we answer a question of Linial and Morgenstern about minimizing the q -norm of a probabilistic vector with given p -norm for integers $q > p > 1$. For integers $\ell \equiv 2 \pmod 4$, however the same phenomena do not hold for ℓ -cycles, for which we can construct an explicit family of tournaments containing fewer ℓ -cycles for any given number of 3-cycles. We conclude by proposing two conjectures on the minimization problem for general cycles in tournaments. Joint with Tianyun Tang.

The Ramsey number of hypergraph paths

彭兴 (安徽大学)

In this talk, we will discuss results and problems related to the Ramsey number of hypergraph paths.

Tree-star Ramsey number

彭岳建（湖南大学）

Let T_n be a tree on n vertices and $K_{1,m}$ be the star with $m+1$ vertices. For graphs G and H , the Ramsey Number $R(G, H)$ is the smallest integer N such that any red-blue-coloring of the edges of K_N yields a red G or a blue H . A well-known result is that if G is a graph with minimum degree $n-1$, then T_n can be embedded into G . Applying this result, Burr gave an upper bound for the Ramsey number $R(T_n, K_{1,m})$ and determined the exact value of $R(T_n, K_{1,m})$ for some cases. Guo and Volkmann showed that if G is a connected graph with at least n vertices and minimum degree $n-2$, then T_n can be embedded into G except $T_n = K_{1,n-1}$. Applying this, they improved that bound of $R(T_n, K_{1,m})$ in the result of Burr by 1 for some cases and obtain the exact value of $R(T_n, K_{1,m})$ for some cases in addition to Burr's result. Guo and Volkmann also conjectured that if G is a connected graph with at least n vertices and minimum degree $n-3$, then T_n with maximum degree $\leq n-4$ can be embedded into G .

In this paper, we obtain a sufficient and necessary condition that T_n with maximum degree $\leq n-3$ can be embedded into a connected graph G with at least n vertices and minimum degree $\geq n-3$. Our result implies that the conjecture of Guo and Volkmann is true with one exception. Applying this result, we improve the upper bound of $R(T_n, K_{1,m})$ and determine the exact value of $R(T_n, K_{1,m})$ for some cases.

This is a joint work with Yan Zi-Long.

Anti-Ramsey numbers of graphs and hypergraphs

史永堂（南开大学）

Motivated by anti-Ramsey numbers introduced by Erdos, Simonovits and Sos in 1975, we study the anti-Ramsey problem when host graphs are plane triangulations and hypergraphs. In this talk, we will present some recent results on anti-Ramsey numbers for graphs and hypergraphs, including planar anti-Ramsey numbers of paths and matchings, and anti-Ramsey numbers of paths and cycles in hypergraphs.

Non-linear Hamilton cycles in linear quasi-random hypergraphs

王光辉（山东大学）

In this paper we show that for $\ell < k$ satisfying $(k-\ell) \nmid k$, (p, μ) -denseness plus a minimum $(\ell+1)$ -vertex-degree $\alpha n^{k-\ell-1}$ guarantees Hamilton ℓ -cycles, but requiring a minimum ℓ -vertex-degree $\Omega(n^{k-\ell})$ instead is not sufficient. This answers a question of Lenz--Mubayi--Mycroft and characterizes the triples (k, ℓ, d) such that degenerate choices of p and α force ℓ -Hamiltonicity. We actually prove a general result on ℓ -Hamiltonicity in quasi-random k -graphs, assuming a minimum vertex degree and essentially that every two ℓ -sets can be connected by a constant length ℓ -path. This result

reduces the ℓ -Hamiltonicity problem to the study of the connection property. This is a joint work with Jie Han and Xichao Shu.

Ramsey type problem for highly-edge-connected monochromatic subgraphs

吴河辉（上海数学中心/复旦大学）

Bollobás and Gyárfás conjectured that for any integers k, n with $n > 4(k-1)$, for any 2-edge-coloring of the complete graph on n vertices, there is a k -connected monochromatic subgraph with at least $n-2k+2$ vertices. We find a counterexample of the conjecture with $n = \lceil 5k - 2.5\sqrt{2k-1} \rceil$. Furthermore, we show that this bound is sharp for k large enough, that is, for any 2-edge-colorings of K_n with $n > 5k - 2.5\sqrt{2k-1}$, there is a k -connected subgraphs with size at least $n-2k+1$.