一．日程表

<table>
<tr><td>4月19日
全天</td><td colspan="3">登记入住金沙湾宾馆</td></tr>
<tr><td colspan="4">晚餐 18:00，金沙湾宾馆一楼西沙厅</td></tr>
<tr><td rowspan="9">4月20日
上午</td><td>08:15</td><td colspan="2">金沙湾宾馆一楼集合，统一乘车前往会场</td></tr>
<tr><td>08:30-09:00</td><td colspan="2">注册报到、开幕式</td></tr>
<tr><td>主持人</td><td colspan="2">张福基</td></tr>
<tr><td>09:00-09:30</td><td>黄元秋</td><td>The Drawings of Graphs, the Planarity, and Relevant Graph Parameters</td></tr>
<tr><td>09:30-10:00</td><td>张治华</td><td>天然和人工的 DNA 的拓扑结构及其相关数学问题</td></tr>
<tr><td>10:00-10:30</td><td colspan="2">合影、茶歇</td></tr>
<tr><td>主持人</td><td colspan="2">金贤安</td></tr>
<tr><td>10:30-11:00</td><td>程志云</td><td>Plucking Polynomial of Rooted Trees</td></tr>
<tr><td>11:00-11:30</td><td>吴忠涛</td><td>On Alexander Polynomials of Graphs</td></tr>
<tr><td colspan="4">午餐 12:00，大丰苑二楼，餐后乘车返回酒店</td></tr>
<tr><td rowspan="7">4月20日
下午</td><td>14:45</td><td colspan="2">金沙湾宾馆一楼集合，统一乘车前往会场</td></tr>
<tr><td>主持人</td><td colspan="2">晏卫根</td></tr>
<tr><td>15:00-15:30</td><td>陈仪朝</td><td>群代数与图嵌入</td></tr>
<tr><td>15:30-16:00</td><td>杨　艳</td><td>The Thickness and Split Number of Graphs</td></tr>
<tr><td>16:00-16:30</td><td colspan="2">茶歇</td></tr>
<tr><td>主持人</td><td colspan="2">罗元勋</td></tr>
<tr><td>16:30-17:00</td><td>欧阳章东</td><td>Zip Product of Graphs and Crossing Numbers</td></tr>
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<table>
<tr><td rowspan="2"></td><td>17:00-17:30</td><td>吕胜祥</td><td>Demigenus Embedding of Signed Complete Bipartite Graphs</td></tr>
<tr><td>17:30-18:00</td><td>刘文忠</td><td>Quadrangular Embeddings of Complete Graphs and the Even Map Color Theorem</td></tr>
<tr><td colspan="4">晚餐 18:15，大丰苑二楼，餐后乘车返回酒店（限参会教师）</td></tr>
<tr><td rowspan="8">4 月 21 日
上午</td><td>08:45</td><td colspan="2">金沙湾宾馆一楼集合，统一乘车前往会场</td></tr>
<tr><td>主持人</td><td colspan="2">陈海燕</td></tr>
<tr><td>09:00-9:30</td><td>胡　广</td><td>CoCoPO 笼的动力学模拟研究</td></tr>
<tr><td>9:30-10:15</td><td>吴德印</td><td>图论在物理化学中的应用</td></tr>
<tr><td>10:15-10:45</td><td colspan="2">茶歇</td></tr>
<tr><td>主持人</td><td colspan="2">杨维玲</td></tr>
<tr><td>10:45-11:15</td><td>戈　鋆</td><td>Spanning Trees in Bipartite Graphs</td></tr>
<tr><td>11:15-11:45</td><td>邓青英</td><td>Projectors in the Virtual Temperley-Lieb Algebra</td></tr>
<tr><td colspan="4">午餐 12:00，大丰苑二楼，餐后乘车返回酒店</td></tr>
<tr><td>4 月 21 日
下午</td><td colspan="3">离会</td></tr>
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二．学术报告题目与摘要

The Drawings of Graphs, the Planarity，and Relevant Graph Parameters

黄元秋（湖南师范大学）

Abstract: Planar graphs are important ones in the study of graph theory. Based on drawings of graphs on the plane, we briefly introduce several graph-drawing parameters, and survey recent developments and open problems concerning these parameters. I also present some our recent results on this subject.

天然和人工的 DNA 的拓扑结构及其相关数学问题

张治华（中国科学院北京基因组研究所）

摘要：DNA 是生命遗传的基本物质。DNA 从数学上可以表示为 A、T、G 和 C 四种字符构成的长字符串。从拓扑学上看，DNA 就是一个长的线性链条。DNA 在生命体中有多种形式的存在。不同形式的 DNA 具有迥异的拓扑结构。结构对于 DNA 的功能具有关键的作用。例如，人基因组 DNA 物理总长度大约为两米，但它需要被折叠进入大约微米级别的细胞核中。因此，基因组 DNA 具有非常严格的，层次化的空间结构。为了折叠出这样的拓扑结构，生命系统演化出复杂的调控机制，使得 DNA 可以被有效的折叠为既可以高效信息流动，又不会产生致死的拓扑扭结。最近 DNA 作为一种结构性的分子，被研究人员改造成具有特定结构的纳米分子材料，并在其中实现了比较复杂的 DNA 计算功能。为了实现这样的运算功能，DNA 空间拓扑结构必须满足特定的形式。由于这些天然和人工的 DNA 的拓扑结构的重要作用，使得 DNA 的拓扑结构研究成为当前的一个重要热点。我的报告将在简要综述当前的天然和人工 DNA 拓扑结构的基础上，讨论与之相关的数学物理问题。

Plucking Polynomial of Rooted Trees

程志云（北京师范大学）

Abstract: For each embedded rooted tree on the upper half plane, Jozef Przycycki introduced the notion of plucking polynomial in 2015. In this talk, I will give a short introduction to this polynomial and discuss some basic questions about it.

On Alexander Polynomials of Graphs

吴忠涛（香港中文大学）

Abstract: Using Alexander modules, one can define a polynomial invariant for a certain class of graphs with a balanced coloring. We will give different interpretations of this polynomial by Kauffman state formula and MOY relations. This is joint work with Yuanyuan Bao.

群代数与图嵌入

陈仪朝（苏州科技大学）

摘要：对称群及其表示含有图嵌入（分布）的丰富信息，本报告将讨论这两者的联系，以及报告人最近的一些工作。

The Thickness and Split Number of Graphs

杨艳（天津大学）

Abstract: The thickness of a graph G is the minimum number of planar subgraphs into which G can be decomposed. A k-split operation substitutes a vertex v by at most k new vertices such that each neighbor of v is connected to at least one of the new vertices. The split number of a graph G is the smallest k such that the graph is k-splittable into a planar graph. In this talk, some recent progresses in both thickness and split number of graphs will be introduced.

Zip Product of Graphs and Crossing Numbers

欧阳章东（湖南第一师范学院）

Abstract: D. Bokal proved that the crossing number is additive for the zip product under the condition of having two coherent bundles in the zipped graphs. This property is very effective when dealing with the crossing numbers of (capped) Cartesian product of trees with graphs containing a dominating vertex. In this talk, we first weaken the additive condition for the zip product. Based on the new condition, we then establish some general expressions for bounding the crossing numbers of (capped) Cartesian product of trees with graphs (possibly without dominating vertex). Exact values of the crossing numbers for Cartesian product of trees with most graphs of order at most five are obtained by applying these expressions, which extend some previous results due to M. Kle\v{s}\v{c}. In fact, our results can also be applied to deal with the Cartesian product of trees with graphs of order more than five. This is joint work with Yuanqiu Huang, Fengmin Dong, and Eng Guan Tay.

Demigenus Embedding of Signed Complete Bipartite Graphs

吕胜祥（湖南科技大学）

Abstract: A signed graph is a pair $\Sigma=(G,\sigma)$ that consists of a graph $G=(V,E)$ a signature or sign mapping σ from E to the sign group $\{+,-\}$. Given an unsigned graph G, a natural question is which signature σ gives (G,σ) the largest demigenus. That leads to the quantity $D(G)=\max\{d(G,\sigma)\,|\,\sigma:E\to\{+,-\}\}$, that is, the largest demigenus of any signature on a graph G. Archdeacon proposed the open problem: Find $D(K_{m,n})$, the largest demigenus over all signatures on the complete bipartite graph $K_{m,n}$. This talk focuses on recent developments on Archdeacon's open problem.

Quadrangular Embeddings of Complete Graphs and the Even Map Color Theorem

刘文忠（南京航空航天大学）

Abstract: Hartsfield and Ringel constructed orientable quadrangular embeddings of the complete graph Kn for n ≡ 5 (mod 8), and nonorientable ones for n ≥ 9 and n ≡ 1 (mod 4). These provide minimal quadrangulations of their underlying surfaces. We extend these results to determine, for every complete graph Kn, n ≥ 4, the minimum genus, both orientable and nonorientable, for the surface in which Kn has an embedding with all faces of degree at least 4, and also for the surface in which Kn has an embedding with all faces of even degree. These last embeddings provide sharpness examples for a result of Hutchinson bounding the chromatic number of graphs embedded with all faces of even degree, completing the proof of the Even Map Color Theorem. We also show that if a connected simple graph G has a perfect matching and a cycle then the lexicographic product G[K4] has orientable and nonorientable quadrangular embeddings; this provides new examples of minimal quadrangulations. This is a joint work with S. Lawrencenko, B. F. Chen, M. N. Ellingham, N. Hartsfield, H. Yang, D. Ye and X. Y. Zha.

CoCoPO 笼的动力学模拟研究

胡　广（苏州大学基础医学与生物科学学院）

摘要：卷曲螺旋 (Coiled-coil, CC) 是存在于多种天然蛋白质中的结构模式，其中最常见的类型是二聚体和三聚体。在合成生物学中，CC 二聚体可以模拟 DNA 分子作为模块化的组装原件，用于从头设计新的蛋白质折叠结构：CoCoPO (coiled-coil protein origami)。基于 Roman 等人的工作 [1, 2]，我们利用分子动力学模拟（MD）的方法研究了 17 个 CoCoPO 体系，包括 13 个四面体，2 个三角双锥和 2 个三棱柱。均方根偏差（RMSD）和回转半径 (Rg) 表明大部分 CoCoPO 体系都是稳定的，但是稳定性会受体系初始结构的影响，与小角散射实验（SAXS）数据的拟合也证实了 MD 模拟结果的准确性; 均方根波动 (RMSF) 结

合其它局部参数发现四面体 TET12-2.3-SN-f5b 中 APH4sn 双聚体显示很大的波动性; 进一步地比较发现 CC 二聚体在孤立和笼状状态下的动力学性质是保守的; 最后针对我们的 MD 发现，对 APH4sn 的不稳定位点进行定点突变，设计更为稳定的结构。我们的结果表明 CoCoPO 的稳定性由 CC 二聚体的稳定性决定，并能帮助进一步的分子设计。

[1]. Gradišar H, et al. (2013) Design of a single-chain polypeptide tetrahedron assembled from coiled-coil segments. Nature Chem. Biol. 9: 362–366.

[2]. Ljubetic A, et al. (2017) Design of coiled-coil protein-origami cages that self-assemble in vitro and in vivo. Nat Biotechnol 35:1094–1101.

Spanning Trees in Bipartite Graphs

戈　鋆（四川师范大学/新加坡南洋理工大学）

Abstract: In this talk, we will introduce the electrical network methord in counting spanning trees. We will obtain the number of spanning trees in complete bipartite graphs with or without some certain structures. A conjecture by Ehrenborg on a tight upper bound for the number of spanning trees in a bipartite graph will be discussed.

Projectors in the Virtual Temperley-Lieb Algebra

邓青英（湘潭大学）

Abstract: The n-strand virtual Temperley-Lieb algebra VTLn is an algebra over the ring , which is generated by $\{e_1, e_2, \cdots, e_{n-1}, v_1, v_2, \cdots, v_{n-1}\}$. The diagrammatic formulation of VTLn is equivalent to Brauer algebra. In particular, the Temperley-Lieb algebra TLn is a sub-algebra of VTLn, which is generated by $\{e_1, e_2, \cdots, e_{n-1}\}$. Wenzl and Jones had proposed the notion of projectors in Temperley-Lieb algebra. Later, people called them Jones-Wenzl projectors. In this talk, we present a method of defining projectors in the virtual Temperley-Lieb algebra, that generalizes the Jones-Wenzl projectors in Temperley-Lieb algebra. And we give an explicit formula for the projectors.

图论在物理化学中的应用

吴德印（厦门大学化学化工学院）

摘要：TBA