Titles and Abstracts

1. Brian Alspach, School of Mathematical and Physical Sciences, University of Newcastle, Callaghan, NSW 2308, Australia

Title: Honeycomb Toroidal Graphs

Abstract: I shall look at three unsolved problems for which the same class of graphs arises as an impediment towards solutions. These graphs are known as *honeycomb toroidal graphs*. I hope to convince you it is a class worthy of further study.

2. Adrian Bondy, University Claude Bernard Lyon 1

Title: The Mind's Eye Project: Linking Mathematics and Photography

Abstract: Mind's Eye is a French non-profit association whose aim is to search for and bring to light conceptual links between mathematics and photography.

What is there in common between the image in the mind of the mathematician when he comes up with a new notion, and that of the photographer when he conceives a photographic work; of the mathematician when he finds a solution, and of the photographer at the moment he presses the shutter? The goal is not to collect and present photographic works directly inspired by mathematical objects, nor to study or create direct links on the purely visual level between mathematics and photography, nor yet to reveal in photography some fascinating aspect of mathematics presented according to a certain aesthetic paradigm.

Without appealing to biased or artificially-created correspondences, Minds Eye seeks to link the essence of mathematical activity, its beauty and the strength of its ideas, with the essence of photography, its creativity and its power of expression. Even if the vast majority of photographic works do not fit into this framework, it is striking to find some which do indeed echo fundamental mathematical concepts and their ramifications.

3. Kathie Cameron, Wilfrid Laurier University, Waterloo, Canada

Title: Recognition and Optimization for Classes of Even-Hole-Free Graphs

Abstract: An induced subgraph of a graph consists of a subset of the vertices and all edges of the graph with both ends in that subset. Where $\mathcal{H}$ is a set of graphs, a graph G is called $\mathcal{H}$-free if G has no induced subgraph isomorphic to any member of $\mathcal{H}$.

Some main problems which have been studied for $\mathcal{H}$-free graphs G, for various explicit sets $\mathcal{H}$, are to find polynomial-time algorithms for recognition, maximum weight stable set of vertices, and minimum colouring (that is, minimum partition into stable sets), and these optimization problems for the complementary graph $\overline{G}$.

Here we briefly survey some successes, and lack of success, regarding these problems for some given $\mathcal{H}$-freeness. To illustrate, we emphasize recent success where $\mathcal{H}$ consists of caps and even cycles. A cap is a cycle with at least four vertices together with an extra vertex joined to two adjacent vertices of the cycle.

This is joint work with Murilo V. G. da Silva, Shenwei Huang and Kristina Vušković.

4. Guantao Chen, Department of Mathematics and Statistics, Georgia State University, Atlanta, Georgia, 30303

Title: Goldberg's Conjecture and Tashkinov Trees

Abstract: Given a graph G possibly with multiple edges but no loops, denote by Δ the *maximum degree*, μ the *multiplicity*, χ' the *chromatic index* and χ'_f the *fractional chromatic index* of G, respectively. Gupta (1967), Goldberg (1973), Andersen (1977), and Seymour (1979) conjectured that $\chi' = \lceil \chi'_f \rceil$ if $\chi' \geq \Delta + 2$. Inspired by the Tashkinov tree technique, some progress has made toward this conjecture in the last decade. Chen, Gao, Kim, Postle and Shan recently showed that if $\chi' > \Delta + \sqrt[3]{\Delta/2}$ then $\chi' = \lceil \chi'_f \rceil$. The key technic result of their proof states that the number of edges of a special vertex set (elementary set) of a k-critical graph is bounded below by a function of k. Replacing the number of edges by the number of different colors, we obtain a stronger result. We will talk this result and its applications.

This is a joint work with Guangming Jing.

5. Xiaotie Deng, Shanghai Jiaotong University, China

Title: Understanding PPA II (jointly with J. Edmonds)

Abstract: In this talk, we review the complexity class PPA (polynomial parity argument) which includes combinatorial problems that have a proof based on parity arguement for the existence but in general the standard path following algorithm demands an exponential number of steps, a computational complexity class characterized by Papadimitriou in his seminal paper in 1994, as a subclass of TFNP. The class includes interesting combinatorial problems and this talk discusses recent developments for problems included in PPA and PPA-complete. Part II mainly deals with the hardness part of development.

6. Jack Edmonds, University of Waterloo, Canada

Title: Understanding PPA

Abstract: A "good parity theorem" asserts that, for any instance of the theorem, there exists an even number of easily recognizable (i.e., NP) "desired" structures.

Example: For any triangulation, T, of a closed surface into triangles, called the rooms of T, a "room-partition" means a subset of the rooms which partition the vertices of T (i.e., each vertex in exactly one of that subset). Any T has an even number of room-partitions. Of great computational-complexity interest is the search problem: given any instance of a good parity theorem and a given a "desired" structure P, find a "desired" structure different from P.

Example: given any surface triangulation T and any room-partition P of T, find a room-partition of T which is different from P. Though we know that another room-partition is there, we do not know any polynomial time algorithm for finding one.

A good parity theorem is called a PPA theorem if it can be proved by a "PPA algorithm" - that is an algorithm which reversibly pivots uniquely from any "desired"

structure through certain other easily computed structures until it reaches a different "desired" structure.

Example: Given a triangulation T and a room-partition P, then having chosen any vertex w_1, replace the room in P containing w_1 by the adjacent room not containing w_1 but containing different vertex, say w_2. Then replace the other tentatively chosen room containing w_2 by the adjacent room not containing w_2, and so on, until reaching a room with w_1, thus obtaining a room-partition different from P.

This simple PPA algorithm proves that there are an even number of room-partitions. However it is known that the algorithm might do a number of pivots which is exponential relative to the number of rooms of T. There are a few known PPA-complete search problems, that is, PPA problems to which any other PPA problem can be polynomial-time reduced. However each known one seems to need a generic Boolean circuit, or Turing machine, as part of the input.

Is room-partitioning PPA-complete? Are any other elegant PPA theorems reducible to it? We will survey some other PPA theorems.

7. Xinmin Hou, School of Mathematical Sciences, University of Science and Technology of China, Hefei, Anhui 230026, China

Title: Turán number and decomposition number of intersecting odd cycles

Abstract: Given a graph H, the Turán function $ex(n,H)$ is the maximum number of edges in a graph on n vertices that does not contain H as a subgraph. Let s,t be integers and let $H_{s,t}$ be a graph consisting of s triangles and t cycles of odd lengths at least 5 which intersect in exactly one common vertex. Let $\phi(n,H)$ be the smallest integer such that, for all graphs G on n vertices, the edge set $E(G)$ can be partitioned into at most $\phi(n,H)$ parts, of which every part either is a single edge or forms a graph isomorphic to H. Pikhurko and Sousa conjectured that $\phi(n,H)=ex(n,H)$ for $\chi(H)\geq 3$ and all sufficiently large n. In this talk, we will survey the works related to the Turán function and decomposition number of $H_{s,t}$.

8. Zhiquan Hu, Faculty of Math & Statistics, Central China Normal University, Wuhan, China

Title: Long Cycles Passing Through Given Elements in a Graph

Abstract: In this talk, we show some results on long cycles through given elements in a graph. In particular, we consider the following problem proposed by Locke and Zhang in [Graphs and Combinatorics 7 (1991) 265-269]: Let G be a k-connected graph with minimum degree d and X a set of m vertices on a cycle of G. For which values of m and k, with $m>k\geq 2$, must G have a cycle of length at least $min\{2d,|V(G)|\}$ passing through X? Fujisawa and Yamashita solved this problem for the case $k\geq 3$ and $m=k+1$ in [Journal of Graph Theory 58 (2008), 179-190]. We provide an affirmative answer to this problem for the case of $k\geq 3$ and $k+1\leq m\leq \lfloor\frac{4k+1}{3}\rfloor$. This is a joint work with Feifei Song.

9. Liying Kang, Department of Mathematics, Shanghai University, Shanghai 200444, China

Title: Minimum Power Dominating Sets of Random Cubic Graphs

Abstract: We present two heuristics for finding a small power dominating set of cubic graphs. We analyse the performance of these heuristics on random cubic graphs using differential equations. In this way, we prove that the proportion of vertices in a minimum power dominating set of a random cubic graph is asymptotically almost surely at most 0.067801. We also provide a corresponding lower bound of $1/29.7 \approx 0.03367$ using known results on bisection width. This is a joint work with Nicholas Wormald from School of Mathematical Sciences, Monash University VIC, Australia.

10. H. A. Kierstead, Arizona State University

Title: Witnessing generalized coloring numbers uniformly

Abstract: For a graph $G = (V, E)$, let $\Pi(G)$ be the set of total orderings on V. For $x \in V$ and $\sigma \in \Pi(G)$, let $V^l_\sigma[x] = \{y \in V : y \leq_\sigma x\}$ and $V^r_\sigma[x] = \{y \in V : y \geq_\sigma x\}$. Let $R^k_\sigma[x]$ be the set of vertices that are strongly k-reachable from x with respect to σ, that is, those vertices $v \in V^l_\sigma[x]$ such that there is an x, y-path P with $V(P) \subseteq V^r_\sigma[x]+y$ and $|E(P)| \leq k$. The *strong k-coloring number* of G with respect to σ and the strong k-coloring number of G are defined by

$$sclo_k(G, \sigma) = \max_{x \in V} |R^k_\sigma[x]|; sclo_k(G) = \min_{\sigma \in \Pi(G)} sclo_k(G, \sigma).$$

It is known that a graph class $\mathcal{G}$ has bounded expansion iff there is a function $c : \mathbb{Z}^+ \to \mathbb{Z}^+$ such that for all $G \in \mathcal{G}$,

(*) $$sclo_k(G) \leq c_k \text{ for all k} \in \mathbb{Z}^+.$$

Let $\mathcal{G}_c$ be the class of graphs G that satisfy (*). We use game k-coloring numbers to investigate the following question.

Question. *Is it true that for all $c : \mathbb{Z}^+ \to \mathbb{Z}^+$ there exists $c' : \mathbb{Z}^+ \to \mathbb{Z}^+$ such that for all $G \in \mathcal{G}_c$ there is $\sigma \in \Pi(G)$ with $sclo_k(G) \leq c'_k$* for all *$k \in \mathbb{Z}^+$?*

This is a joint work with Jan van den Heuvel.

11. Jianping Li, Yunnan University, China

Title: Approximations for a new variant of the Steiner tree problem in the Euclidean plane

Abstract: In this talk, we study unitary equivalences and reducing lattices of analytic Toeplitz operators on Bergman spaces over polygons. It is shown that the geometry of polygons plays an important role in the study. This is a joint work with Professor Dechao Zheng.

12. Xiangwen Li, School of Mathematics & Statictics, Central China Normal University, China

Title: Strong edge-coloring of Pseudo-Halin graphs

Abstract: For a set of points $X = \{r_1, r_2, \ldots, r_n\}$ in the Euclidean plane $\mathbb{R}^2$, a positive constant l and some stock pieces of length L ($l \leq L$), where the cost of each Steiner point used is c_1, and the selling price of each stock piece is c_3, it is asked

to construct a Steiner tree T interconnecting the terminals such that each edge in the tree T has a length no more than l, the new objective is to minimize the total construction cost to construct such a Steiner tree T, i.e.,

$$\min_T \{c_1 k_1(T) + c_2 \sum_{e \in T} w(e) + c_3 k_3(T)\}$$

where $k_1(T)$ is the number of Steiner points used, c_2 is a construction cost of per unit length, $k_3(T)$ is the number of necessary stock pieces of length L to construct all edges in such a Steiner tree T.

In this talk, we present two approximation algorithms with performance ratios 4 and 3 to solve this new variant of the Steiner tree problem. This is a joint work with Wencheng Wang.

13. Huiqing LIU, Faculty of Mathematics and Statistics, Hubei University, Wuhan 430062, China

Title: Spanning k-ended trees in quasi-claw-free graphs

Abstract: Let $N[v] = N(v) \cup \{v\}$ and $J(u,v) = \{w \in N(u) \cap N(v) : N(w) \subseteq N[u] \cup N[v]\}$. A graph G is called quasi-claw-free if $J(u,v) \neq \emptyset$ for any $u, v \in V(G)$ with $d(u,v) = 2$. In this paper, we show that if G is a connected quasi-claw-free graph of order n with $\sigma_{k+1}(G) \geq n - k$, then G contains a spanning k-ended tree, which generalizes some known results. This is a joint work with Xiaodong Chen.

14. Fuliang Lu, Department of Math, Linyi University, Linyi, Shandong 276000, P. R. China

Title: A characterization of Pfaffian Abelian Cayley graphs

Abstract: A graph Γ_1 is a matching minor of Γ if some even subdivision of Γ_1 is isomorphic to a subgraph Γ_2 of Γ, and by deleting the vertices of Γ_2 from Γ the left subgraph has a perfect matching. Motivating by the study on Pfaffian graphs (the numbers of perfect matchings of those graphs can be computed in polynomial time), we characterized Pfaffian Abelian Cayley graphs in terms of $K_{3,3}$ matching minor. This result confirms that the conjecture posed by Norine and Thomas in 2008 for Abelian Cayley graph is true. This is a joint work with Lianzhu Zhang.

15. You Lu, Department of Applied Mathematics, School of Science, Northwestern Polytechnical University

Title: Integer flows of signed graphs

Abstract: The well-known Bouchetconjecture is that every flow-admissible signed graph admits a nowhere-zero integer 6-flow. Up to now, it remains open, although it has been extensively researched and studied. In this talk, I will give a simple survey on this conjecture, and present our progress on this topic.

16. Rong Luo, Department of Mathematics, West Virginia University, Morgantown, WV 26506

Title: Group Connectivity of Graphs

Abstract: The concept of group connectivity was introduced by Jaeger, Linial, Payan, and Tarsi (Journal Combinatorial Theory, Ser. B, 1992) as a generalization of nowhere-zero group flows. Let A be an Abelian group. An A-connected graphs are contractible configurations of A-flow and play an important role in the study of group flows because of the fact: if H is A-connected, then any supergraph G of H (i.e. G contains H as a subgraph) admits a nowhere-zero A-flow if and only if G/H does. It is known that an A-connected graph cannot be very sparse. How dense could an A-connected graph be? This motivates us to study the extremal problem: find the maximum integer k, denoted $ex(n, A)$, such that every graph with at most k edges is not A-connected. We determine the exact values for all finite cyclic groups. As a corollary, we present a characterization of all Z_k-connected graphic sequences. As noted by Jaeger, Linial, Payan, and Tarsi, there are Z_5-connected graph that are not Z_6-connected. We also prove that every Z_3-connected graph contains two edge-disjoint spanning trees, which implies that every Z_3-connected graph is also A-connected for any Abelian group A with order at least 4.

This is joint work with Hong-Jian Lai and Jiaao Li.

17. Xuezheng Lv, Department of Mathematics, Renmin University of China, Beijing 100872, P.R. China

Title: Total [1,2]-domination in graphs

Abstract: A subset $S \subseteq V$ in a graph $G = (V, E)$ is a total $[1, 2]$-set if, for every vertex $v \in V$, $1 \leq |N(v) \cap S| \leq 2$. The minimum cardinality of a total $[1, 2]$-set of G is called the total $[1, 2]$-domination number, denoted by $\gamma_{t[1,2]}(G)$.

We establish two sharp upper bounds on the total [1,2]-domination number of a graph G in terms of its order and minimum degree, and characterize the corresponding extremal graphs achieving these bounds. Moreover, we give some sufficient conditions for a graph without total $[1, 2]$-set and for a graph with the same total $[1, 2]$-domination number, $[1, 2]$-domination number and domination number. This is joint work with Baoyindureng Wu.

18. Bojan Mohar, Simon Fraser University, Canada & IMFM

Title: Paths and trails of odd length and totally odd immersions of graphs

Abstract: One of the milestones in graph theory is Menger's Theorem which states that the maximum number of edge-disjoint paths between two vertices u and v is equal to the minimum number of edges whose removal disconnects u from v. If we want paths from u to v having additional properties, for example being of odd length, this exact duality no longer holds.

However, a kind of weak duality can be achieved. This problem and its resolution will be discussed and some of its applications will be presented. In particular, totally odd immersions of graphs are tightly related to this topic.

19. Qi Qi, Department of Industrial Engineering and Logistics Management, The Hong Kong University of Science and Technology, Hong Kong

Title: Auction or Lottery?
Balancing Efficiency and Equality in Vehicle Licenses Allocation

Abstract: Due to traffic and air quality concerns in urban cities, vehicle ownership control is considered as a direct and effective method to reduce the increasing demand for private vehicles. Recently many big cities began to adopt the vehicle licenses quantitative control policies. In these cities, a limited number of licenses are allocated every month. The current allocation policies differ from city to city. Several mechanisms have been developed and implemented such as the Vickrey auction, the lottery, the lottery with reserved price, the simultaneous auction and lottery, and the sequential auction and lottery mechanism. In this work, we propose to target the dual objectives of efficiency and equality and present a unified framework that either includes or outperforms all the existing mechanisms. Besides, the unified framework also leads to easy implementation due to its truthfulness and simple structure. Under this framework, we develop the first truthful, equality-guaranteed, socially efficient mechanism and prove this mechanism is also distribution-free under some mild condition. None of the previously proposed mechanisms possessed all these properties simultaneously. Thus, our work provides an effective tool for social planner to design truthful mechanisms to maximize social efficiency under any equality level. We also discuss possible applications of our result to resource allocation in other settings.

(Joint work with Zhou Chen and Changjun Wang.)

20. Michael Tarsi, Tel-Aviv University

Title: The structure of graphs with Circular flow number 5 or more, and the complexity of their recognition problem

Abstract: A concise version for the experts:
We design an arsenal of methods for constructing graphs, in particular Snarks S, with circular flow number $\phi_c(S) \geq 5$. As one indication to the diversity and density of the obtained family of graphs. we show that it is sufficiently rich so that the corresponding recognition problem is NP-complete. At the core of our constructions is the **Algebra of symmetric unions of integer open intervals in the ring** $\mathbb{R}/5\mathbb{Z}$ and its **Graphic Sub-algebra**. Introducing and studying these Algebras is a part of the talk

Some definitions and background for the wider audience:
Given a real number $r \geq 2$, a **circular nowhere-zero r-flow** (r-CNZF) in a graph $G = (V, E)$ is an assignment $f : E \to [1, r-1]$ and an orientation D of G, such that f is a **flow** in D, that is, for every vertex $x \in V$, $\sum_{e \in E^+(x)} f(e) = \sum_{e \in E^-(x)} f(e)$, where $E^+(x)$, respectively $E^-(x)$, are the sets of edges directed from, respectively toward, x in D. The **circular flow number** $\phi_c(G)$ of a graph G is the smallest r for which G admits an r-CNZF.

A **Snark** is a 3-regular cyclically 4-edge-connected graph G, of girth at least 5 and $\phi_c(G) > 4$. For some time the Petersen graph was conjectured to be the only Snark with circular flow number 5 (or more, as long as the assertion of Tutte's 5-flow Conjecture is in doubt) and until recently there was a rather limited family of known

counter examples. All members of the "Classical" families of snarks have their circular flow number strictly between 4 and 5.

This is a joint work with Louis Esperet and Giuseppe Mazzuoccolo

21. Bing Wei, Department of Mathematics, university of Mississippi

Title: On long cycles through specified elements of graphs

Abstract: Let $G = (V(G), E(G))$ be a connected, simple and finite graph. A hamiltonian cycle of G is a cycle containing all vertices in $V(G)$. Dirac and Ore gave degree type conditions for a graph to possess a hamiltonian cycle. Since then a lot of researches on estimating the length of longest cycles with special properties based on degrees and/or degree sums of vertices have been done. In this talk, we will introduce some related results and provide some sharp bounds on the cycle lengths. Further research problems will also be proposed.

22. Yezhou Wu, Zhejiang University

Title: On Circular Flow Conjecture

Abstract: Tutte's 3-Flow Conjecture and 5-Flow Conjecture are kernel problems of graph theory. Jeager generalized those two conjectures to a stronger one, known as the Circular Flow Conjecture, which says that, for every natural number p, every $4p$-edge-connected graph admits a nowhere-zero $(2+\frac{1}{p})$-flow. In this talk, we introduce some results of Circular Flow Conjecture.

23. Baogang Xu, Naijing Normal University, China

Title: Some results on partitions with degree constraints

Abstract: In 1996, Stiebitz confirmed a conjecture of Thomassen and proved that, for any nonnegative integers s and t, every graph G with minimum degree at least $s+t+1$ admits a bipartition S, T such that $\delta(G[S]) \geq s$ and $\delta(G[T]) \geq t$. In this talk, we will present some results related to Stiebitz's theorem.

24. Weihua Yang, Taiyuan University of Technology, China

Title: Paths in Tournaments

Abstract: In this talk, we introduce our recent works on vertex disjoint cycles in tournaments, spanning connectivity of tournaments and anti-cycles in bipartite tournaments.

25. Dong Ye, Department of Mathematical Sciences, Middle Tennessee State University, Murfreesboro, TN 37132, USA

Title: Circuit Covers of Signed Graphs Modules

Abstract: A signed graph is a graph G associated with a mapping $\sigma : E(G) \to \{-1, +1\}$, denoted by (G, σ). A *cycle* of (G, σ) is a connected 2-regular subgraph. A cycle C is *positive* if it has an even number of negative edges, and negative otherwise.

A *circuit* of of a signed graph (G, σ) is a positive cycle or a barbell consisting of two edge-disjoint negative cycles joined by a path. The definition of a circuit of signed graph comes from the signed-graphic matroid. A circuit cover of (G, σ) is a family of circuits covering all edges of (G, σ). A circuit cover with the smallest total length is called a shortest circuit cover of (G, σ) and its length is denoted by $\mathtt{scc}(G, \sigma)$. Bouchet proved that a signed graph with a circuit cover if and only if it is flow-admissible (i.e., has a nowhere-zero integer flow). In this talk, we discuss the recent developments of circuit covers of signed graphs (G, σ) such as shortest circuit cover and circuit k-cover. This is joint work with Yezhou Wu.

26. Aimei YU, Department of Mathematics, Beijing Jiaotong University, Beijing 100044, China

Title: On the Szeged index and revised Szeged index of unicyclic graphs with given diameter

Abstract: Let G be a graph, and $E(G)$ be the edge set of G. For any $e = uv \in E(G)$, $n_u(e|G)$ is the number of vertices of G lying closer to vertex u than to v, $n_v(e|G)$ is the number of vertices of G lying closer to vertex v than to u, and $n_0(e|G)$ is the number of vertices with equal distances from both end vertices of the edge e. The Szeged index of a connected graph G is defined as

$$S_z(G) = \sum_{e=uv \in E(G)} n_u(e|G) n_v(e|G),$$

and the revised Szeged index of a connected graph G is defined as

$$Sz^*(G) = \sum_{e=uv \in E(G)} (n_u(e|G) + \frac{n_0(e|G)}{2})(n_v(e|G) + \frac{n_0(e|G)}{2}).$$

We characterize the graph with smallest Szeged index, and the nonbipartite graph with the minimum revised Szeged index, among all the unicyclic graphs with given order and diameter.

27. Wenan Zang, Department of Mathematics, University of Hong Kong, Hong Kong, China

Title: Recent Advances in Polyhedral Combinatorics

Abstract: Combinatorial optimization searches for an optimal object in a finite collection; typically the collection has a concise representation while the number of objects is huge. Polyhedral and linear programming techniques have proved to be very powerful and successful in tackling various combinatorial optimization problems, and the end products of these methods are often integral polyhedra or min-max relations. This area of combinatorial optimization is called *polyhedral combinatorics*. In this talk I shall give a brief survey of our recent results on polyhedral combinatorics, including a tournament ranking with no errors, a polyhedral description of kernels, and a characterization of the box-totally dual integral (box-TDI) matching polytope.

28. Cunquan Zhang, West Virginia University, USA

Title: Prof. Zhu Yongjin memorial talk – In Memory of Prof. Yongjin Zhu

Abstract: This is a memorial talk dedicated to Prof. Zhu, a founder and pioneer of graph theory in China.

29. Shanfeng Zhu, School of Computer Science and Shanghai Key Lab of Intelligent Information Processing, Fudan University, Shanghai 200433, China

Title: Error Correction of Third Generation Sequencing by De Bruijn Graph

Abstract: High throughput sequencing technology greatly facilitates the discovery of biological mechanism, disease diagnosis and therapy. Third Generation Sequencing has a distinct advantage of long read length, but it has significant shortcomings of high cost and large error rate ($> 15\%$). In contract, second generation sequencing has low error rate ($< 1\%$) with short read length and relatively low cost. Hybrid error correction, using second generation sequencing to correct third generation sequencing, is becoming an important technique to get high quality sequencing data of long read with low cost. In this talk, I will introduce and compare several mainstream methods of hybrid error correction, where De Bruijn graph plays key roles. The challenge of developing more efficient and accurate error correction algorithm will be discussed.

30. Qiang Zhu, School of Mathematics and statistics, Xidian University, Xi'An, Shaanxi, China, 710071

Title: An graph coloring based diagnosis algorithm under the generalized PMC model

Abstract: Fault diagnosis is important to the design and maintenance of large multiprocessor systems. PMC model is the most well known and widely studied model in the system level diagnosis of multiprocessor systems. Under the PMC model, it assumes only node faults can occur in the system. But in reality link faults may occur. So Zhu Qiang proposed the generalized PMC model which allows hybrid fault circumstances. In this talk, we introduced the basics about the generalized PMC model and design an efficient diagnosis algorithm based on a graph-coloring techniques. Given a 1-step diagnosable syndrome, the algorithm can polynomially locate a unique minimum faulty pair consistent with it. If a syndrome is not 1-step diagnosable, a diagnosis graph corresponding to the syndrome can be constructed and the suspicious faulty pairs can be determined. A weight is assigned to each suspicious faulty pair which can measure their occurring probability. The algorithm is shown to be correct, complete, and can be applied to the fault identification for any multiprocessor system. Simulation Results also show that the algorithm is quite efficient.

This is joint work with Cun-Quan Zhang