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組合學的應用(1/3)

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計畫主持人：傅恆霖

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期中自評報告(英文摘要)

In the first year of this 3-year term proposal, we have obtained several important results in cycle systems and graph decompositions which extend the study of my long term research. Also, the study of Applied Combinatorics gets start with finishing writing two joint papers, one with F. Hwang and the other one with Y. Mutoh and M. Jimbo. In coming summer, I have arranged to attend a workshop in Kyoto and then visit M. Jimbo in Keio University and R. Fuji-Hara in Tsukuba University to collaborate the research in the applications of combinatorial designs.

Through the first year, we have finished more than 10 papers which can be seen from my updated vita on publications. Here, we simply report 5 of them.

1. On 3-stage Clos networks with different nonblocking requirements to two types of calls (Joint work with F. Hwang). We prove that 3-stage Clos network $C(n, n, 4, r, 2n)$ satisfies the requirement : strictly nonblocking for point-to-point calls among the 2-cast traffic, and is rearrangeable for genuine 2-cast calls.
2. A resolvable $r \times c$ grid-block packing and its application to DNA library screening (Joint work with Y. Mutoh and M. Jimbo). We give some constructions of a resolvable $r \times c$ grid-block packing and give a brief survey of its application to DNA library screening.
3. Packing graphs with graph of size three (Joint work with Chun-Cheng Chen and Kuo-Ching Huang). We mainly prove a conjecture of G. Chartrand et al that any graph of size $3m$ can be decomposed into isomorphic copies of graphs of size 3.
4. Maximal sets of Hamilton cycles in K_{2^p} -F (Joint work with S. L. Logan and C. A. Rodger). We determine the spectrum of the size of maximal set of Hamilton cycles in K_{2^p} -F with two different proofs.
5. Cyclic m -cycle systems of the complete graph (Joint work with S. L. Wu). We obtain the necessary and sufficient conditions for the existence of a cycle m -cycle system of the complete graph for each $m \leq 32$.

期中自評報告(第一年)

在第一年的研究中，延續以前的研究，在圈系及圖的分割方面分別獲得一些成果；在應用方面則分別在 3-stage Clos Network 及 DNA Screening 方面完成論文的寫作。在今年暑假，我將前往日本開會及訪問，開始與 Jimbo 及 Fuji-Hara 合作組合設計應用的研究。

雖然在這一年中我們完成的論文將近十篇，下面就其中的五篇敘述研究成果的摘要。

1. On 3-stage Clos networks with different nonblocking requirements to two types of calls (Joint work with F. Hwang).

在這篇論文中，我們證明了 3-級 Clos 網路 $C(n, n, 4, r, 2n)$ 在點對點 2-cast 的通話方面絕對不阻塞，而最原始的點對點 2-cast 通話可以重排。

2. A resolvable $r \times c$ grid-block packing and its application to DNA library screening (Joint work with Y. Mutoh and M. Jimbo).

在這篇論文中，我們提供一些可分解 $r \times c$ grid-block 的裝填方法，有了足夠多的 Resolution Classes，就可以應用到 DNA library screening.

3. Packing graphs with graph of size three (Joint work with Chun-Cheng Chen and Kuo-Ching Huang).

在這篇論文中，我們證明了 G. Chartrand 等人的一個猜測：任意邊數為 $3m$ 的圖都可以分割成 m 個同構的 3 邊圖。為了達到這個目的，我們用裝填的概念得到一個更強的結果。

4. Maximal sets of Hamilton cycles in K_{2^p} -F (Joint work with S. L. Logan and C. A. Rodger).

這個結果提供了極多哈密爾頓圈存在的可能性；由於建構方法有其獨到之處，所以這篇論文基本上有兩個不同的證明方法。

5. Cyclic m -cycle systems of the complete graph (Joint work with S. L. Wu).

在這篇論文中，我們以極詳細的方式證明只要 $m \leq 32$ ，循環 m -圈系存在的充要條件可以完全決定。

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