國立中山大學應用數學系
學術演講

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講　題：Optimal Conflict-Avoiding Codes and Mixed-Weight Conflict-Avoiding Codes

時　間：2024/05/17 (Friday) 13:30~14:20

地　點：理 SC 4009-1 教室

茶　會：13:00

Abstract

A conflict-avoiding code (CAC) $\mathcal{C}$ of length L with weight w is a collection of w-subsets of $\mathbb{Z}_L$ such that $d^*(S_1) \cap d^*(S_2) = \emptyset$ for any two distinct w-subsets $S_1, S_2 \in \mathcal{C}$, where $d^*(S) = \{a - b \pmod{L} : a, b \in S, a \neq b\}$. A CAC is a deterministic transmission scheme for asynchronous multiple-access without feedback. When the number of simultaneously active users is less than or equal to w, a CAC of length L with weight w can provide a hard guarantee that each active user has at least one successful transmission within every consecutive L time slots. The design goal of CACs is determine the maximum code size, denoted by $K(L, w)$, for given L and w. A CAC is called optimal if its code size achieves the value $K(L, w)$. In the first part of this talk, we will provide some new class of optimal CACs of length $L = \frac{w-1}{d}p^r$ for various w, odd primes p and any positive integer r.

To deal with different individual performance requirements in heterogeneous systems, in this talk, we relax the identical-weight constraint in prior studies to study mixed-weight CACs for the first time. So, in the second part of this talk, we will propose a general construction of mixed-weight CACs consisting of three different weights, and then obtain a class of optimal mixed-weight CACs containing two different weights. Some involved techniques are related with Kneser's Theorem and some useful tools in Additive Combinatorics.

敬 請 公 告！ 歡 迎 參 加！

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