Conflict-Avoiding Codes of Length $n = 4m$ and Weight 3

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A *conflict-avoiding code* of length n for k active users is a set $C \subseteq \{0,1\}^n$ of binary vectors, called *codewords*, all of Hamming weight k, such that the Hamming distance between arbitrary cyclic shifts of distinct codewords is at least $2k-2$. The support of a codeword is the set of indices of its coordinate positions with 1. A conflict-avoiding code of weight k is said to be *equi-difference* (when $k = 3$, it is said to be *centered*, or *symmetric*), if the supports of all codewords are of the form $\{0, i, 2i, \ldots, (k-1)i\}$ for some $i \in \mathbb{Z}_n \setminus \{0\}$. A conflict-avoiding code of the maximum size is said to be optimal.

In this talk, we will briefly glance at the technical background first, and then by using a kind of graph and linear programming, we will improve previously known upper bounds on the size of an optimal (centered) conflict-avoiding code of length $n = 4m$ and weight 3. Furthermore, it will be proved that the improved upper bounds are sharp for some series of m by direct constructions.