M**inimal number of colors for conflict free colorings of hypercube of dimension m**

Sul-young Choi, Le Moyne College, Syracuse, NY.
Puhua Guan*, University of Puerto Rico, Rio Piedras, Puerto Rico.

Suppose a set of colors is assigned to a subset of vertices S of a graph G. It is called a conflict-free (CF) coloring of G when for each vertex u, its closed neighborhood $N[u]$ contains a vertex v that the color of v appears exactly once in $N[u] \cap S$. A CF coloring is not necessarily a proper coloring. The CF chromatic number of G is the minimum number of colors of such colorings and denoted by $\chi_{CF}(G)$. The CF coloring was introduced by Even et al. (2009) as coloring of geometric regions in a plane motivated by a frequency assignment problem in cellular networks. Later Pach and Tardos studied CF coloring for hypergraphs, and various versions of CF coloring of graphs have followed. One of them is the total conflict free coloring which requires coloring of all vertices. The minimum number of colors of such colorings is called the total CF chromatic number and denoted by $\chi_{TCF}(G)$.

In this talk we consider the CF coloring and total CF coloring of an m-dimensional hypercube Q_m. We show that:
(1). If $m = 2^n - 1$, then $\chi_{CF}(Q_m) = 1$.
(2). If $m = 2^n - 1 + k$ $(0 \leq k < 2^n)$, then $\chi_{CF}(Q_m) \leq \chi_{TCF}(Q_m)$.

It can be easily shown $\chi_{TCF}(Q_1) = 2$, $\chi_{TCF}(Q_2) = 4$, and $\chi_{TCF}(Q_3) = 4$; however we have not been able to establish a formula for $\chi_{TCF}(Q_m)$ in general.

Key words: Conflict free coloring, Chromatic number, Hypercube.