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Conflict-free colorings of uniform hypergraphs with few edges.

A coloring of the vertices of a hypergraph \mathcal{H} is *conflict-free* if for each edge e of \mathcal{H} , some color appears on exactly one vertex of e . The smallest number of colors required for such a coloring is called the *conflict-free chromatic number*, $\chi_{CF}(\mathcal{H})$, of \mathcal{H} . It turned out that conflict-free chromatic number has interesting applications and interesting behavior. Pach and Tardos studied this parameter for graphs and hypergraphs. Among other things, they proved that for each $(2r - 1)$ -uniform hypergraph \mathcal{H} with m edges, $\chi_{CF}(\mathcal{H})$ is at most $C m^{1/r} \log m$. They also asked whether the same result holds for r -uniform hypergraphs. We show that this is not true. Furthermore, we provide new lower and upper bounds on the minimum number of edges in an r -uniform simple hypergraph that is not conflict-free k -colorable. (Received August 02, 2010)