

Meeting: 1003, Atlanta, Georgia, SS 24A, AMS Special Session on Design Theory and Graph Theory, I

1003-05-129 **Vitaly Voloshin*** (vvoloshin@troyst.edu), Troy State University, Troy, AL 36082. *Coloring Block Designs as Mixed Hypergraphs: a survey.*

Mixed hypergraph is a triple $\mathcal{H} = (X, \mathcal{C}, \mathcal{D})$ with vertex set X and two families of subsets called \mathcal{C} -edges and \mathcal{D} -edges respectively. Proper k -coloring of \mathcal{H} is a mapping from X into a set of k colors in such a way that every \mathcal{C} -edge has two vertices of a Common color and every \mathcal{D} -edge has two vertices of Different colors.

When looking at Steiner systems as mixed hypergraphs, when all the blocks are regarded as \mathcal{D} -edges, we have a hypergraph of the type $\mathcal{H} = (X, \emptyset, \mathcal{B})$. In this case, we keep the classic notation $S(t, k, v)$. When all the blocks are regarded as \mathcal{C} -edges, we have a hypergraph of the type $\mathcal{H} = (X, \mathcal{B}, \emptyset)$ and use the notation “ $CS(t, k, v)$ ”. Finally, when all the blocks are bi-edges, we consider a hypergraph of the type $\mathcal{H} = (X, \mathcal{B}, \mathcal{B})$. In this case, we use the notation “ $BS(t, k, v)$ ”.

We survey results and open problems on uncolorability, the lower and upper chromatic numbers and the chromatic spectrum of some block designs considered as mixed hypergraphs. (Received August 12, 2004)