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On the Chromatic Number of Cayley Tables of Dihedral Groups

A coloring of a Latin square is an assignment of k colors to its cells such that no two cells in the same row, the same column, or containing the same symbol receive the same color. The chromatic number of a Latin square L is the minimum number of colors for which such a coloring exists, and is denoted by $\chi(L)$. The Cayley table of a finite group G of order n is a Latin square denoted by L_G. For any finite group G of order n, it is known that $\chi(L_G) \neq n+1$. Hence, $\chi(L_G) = n$ or $\chi(L_G) \geq n+2$. Recently, it was proven that $\chi(L_G) = n$ if and only if every Sylow 2-subgroup of G is either trivial or non-cyclic. Consequently, finite groups G satisfying $\chi(L_G) = n$ can be completely characterized. In this talk, we show that the dihedral group D_n, for odd n, has a cyclic Sylow 2-subgroup, and therefore $\chi(L_{D_n}) \geq 2n+2$. We then prove that $\chi(L_{D_p}) = 2p+2$ for every prime $p > 3$, showing that these Latin squares attain the coloring bound.

This is joint work with E.S. Mahmoodian.