About Colorings of (3,3)-Uniform Complete Circular Mixed Hypergraphs

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A mixed hypergraph is a triple $\mathcal{H}=(X,\mathcal{C},\mathcal{D})$, where X is the vertex set and each of $\mathcal{C}$ and $\mathcal{D}$ is a family of subsets of X, the $\mathcal{C}$-edges and $\mathcal{D}$-edges, respectively. A proper k-coloring of $\mathcal{H}$ is a mapping such that each $\mathcal{C}$-edge has two vertices with a common color and each $\mathcal{D}$-edge has two vertices with distinct colors. A mixed hypergraph $\mathcal{H}$ is called circular if there exists a host cycle on the vertex set X such that every edge ($\mathcal{C}$- or $\mathcal{D}$-) induces a connected subgraph of this cycle. We propose an algorithm to color the (3,3)-uniform, complete, circular, mixed hypergraphs for every value on its feasible set. In doing so, we show $\chi(\mathcal{H}) = 2$ and $\bar{\chi}(\mathcal{H}) = n/2$ when n is even and $\bar{\chi}(\mathcal{H}) = \frac{n-1}{2}$ when n is odd.

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