On some hypergraph coloring problems

Brendan Nagle

University of South Florida

Of a given bipartite graph G = (V, E), it is elementary to construct a bipartition in time O(|V|+|E|). For a given k-graph H = H(k) with fixed k at least 3, Lovasz proved that it is NP-complete to decide whether H is bipartite. Let Bn= Bn(k) denote the collection of [n]-vertex bipartite k-graphs. We construct, of a given H of Bn, a bipartition in time averaging O(nk) over the class Bn. When k = 3, this result expedites one of Person and Schacht. We also consider the class Fn = Fn(3) of [n]-vertex 3-graphs H = H(3) containing no copies of the Fano plane F = F(3) as a subhypergraph. We construct, of a given H of Fn, a smallest proper coloring in time averaging O(n3) over the class Fn. This result also expedites one of Person and Schacht.

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