

The complexity of perfect matchings and packings in dense hypergraphs

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Given two k -graphs H and F , a perfect F -packing in H is a collection of vertex-disjoint copies of F in H which together cover all the vertices in H . In the case when F is a single edge, a perfect F -packing is simply a perfect matching. For a given fixed F , it is generally the case that the decision problem whether an n -vertex k -graph H contains a perfect F -packing is NP-complete. In this talk we describe a general tool which can be used to determine classes of (hyper)graphs for which the corresponding decision problem for perfect F -packings is polynomial time solvable. We then give applications of this tool. For example, we give a minimum l -degree condition for which it is polynomial time solvable to determine whether a k -graph satisfying this condition has a perfect matching (partially resolving a conjecture of Keevash, Knox and Mycroft). We also answer a question of Yuster concerning perfect F -packings in graphs.