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Regular or vertex-transitive q -complementary hypergraphs

If a complete uniform hypergraph can be decomposed into q isomorphic hypergraphs which are permuted cyclically by some permutation of the vertex set, then each hypergraph in the decomposition is called *q -complementary*, as these objects generalize self-complementary graphs. We present necessary and sufficient conditions on the order of a vertex-transitive q -complementary hypergraph. These hypergraphs correspond to large sets of q isomorphic designs. We also construct regular self-complementary uniform hypergraphs of all possible orders.