Classifications of graphical m-semiregular representation of finite groups

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A graph or digraph is called *regular* if each vertex has the same valency, or, the same out-valency and the same in-valency, respectively. Recently, we extend the classical notion of *digraphical* and *graphical regular representation* of a group. A *(di)graphical m-semiregular representation* (respectively, GmSR and DmSR, for short) of a group G is a regular (di)graph whose automorphism group is isomorphic to G and acts semiregularly on the vertex set with m orbits. When $m = 1$, this definition agrees with the classical notion of GRR and DRR. Finite groups admitting a D1SR were classified by Babai in 1980, and the analogue classification of finite groups admitting a G1SR was completed by Godsil in 1981. Pivoting on these two results, we classify finite groups admitting a GmSR or a DmSR (for arbitrary positive integers m) and also do some work about bipartite (di)graphs.