Lifting constructions of large vertex-transitive and Cayley graphs of given degree and diameter

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Constructions of large vertex-transitive and Cayley graphs by lifting require careful choice of small base graphs (often with loops and multiple edges) and sophisticated voltage assignments to induce a sufficiently rich group of automorphisms of the lift. In our contribution we present algebraic methods of identification of suitable voltage assignments for reconstruction of existing families of large vertex-transitive and Cayley graphs of given degree and diameter from their quotients. Our analysis may help develop further constructions of large highly symmetric graphs for the degree-diameter problem by voltage assignments.