

Classification of locally dihedral amalgams

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ABSTRACT

An amalgam of rank 2 is a triple $\mathcal{A}$ of finite groups A_1, A_{12}, A_2 such that $A_1 \cap A_2 = A_{12}$. The *degree* of $\mathcal{A}$ is the pair (d_1, d_2) where d_i is the index of A_{12} in A_i for $i = 1, 2$. Let the degree of $\mathcal{A}$ be $(k, 2)$ where $k \geq 3$ and suppose that only the identity subgroup of A_{12} is normal in both A_1 and A_2 , let $K = \text{Core}_{A_1}(A_{12})$ and suppose that $A_1/K \cong D_{2k}$ is the dihedral group of order $2k$. Then under the above conditions $\mathcal{A}$ is called a *locally D_{2k} amalgam*. Such amalgams were classified for $k = 3$ by Djoković and Miller and partially classified for $k = 4$ by Djoković. We classify locally D_{2k} amalgams for all $k \geq 3$ and describe them in terms of generators and relations. We find that if k is odd, then the order of A_1 divides $k \cdot 2^4$ and if k is even there is no upper bound on the order of A_1 , but: if $k \in \{2, 10, 14, 22\} \pmod{24}$ then A_{12} is an elementary abelian 2-group.

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