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Intersection of Metric Balls in Cayley Graphs

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We present a survey on recent results in the intersection of metric balls in Cayley graphs $Cay(G, S)$. The symmetric group S_n, the hyperoctahedral group $\mathbb{Z}_2 \wr S_n$, the free groups are considered as a group G. The generating sets S are specified by the applications in molecular biology and computer science. Permutations as well as signed permutations are used to represent sequences of genes in chromosomes, and global rearrangements like reversals and transpositions correspond to evolutionary changes. Permutations are also used in the representations of interconnection networks which are modeled by Cayley graphs generating by transpositions (the star graph, the bubble sort graph, the complete transposition graph) and reversals (the unburnt and burnt pancake graphs). In coding theory the intersection of metric balls was considered for Hamming and Jonhson graphs which are Cayley graphs. The connection with the vertex reconstruction problem is also shown for all considered cases.