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Independence and Path Independence on Cayley Digraphs of Left Groups and Right Groups

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Abstract : A semigroup S is said to be a left (right) zero semigroup if S satisfies the equation xy=x (xy=y) for all x,y in S. In addition, the semigroup S is called a left (right) group if S is isomorphic to the direct product of a group and a left (right) zero semigroup. The Cayley digraph Cay(S,A) of a semigroup S with a connection set A is defined to be a digraph with the vertex set S and the arc set E(Cay(S,A))={(x,xa) | x∈S, a∈A} where A is any subset of S. All sets in this research are assumed to be finite. Let D be a digraph together with a vertex set V and an arc set E. Let u and v be two different vertices in V and I a nonempty subset of V. The vertices u and v are said to be independent if (u,v)∉E and (v,u)∉E. The set I is called an independent set of D if any two different vertices in I are independent. The independence number of D is the maximum cardinality of an independent set of D. Moreover, the vertices u and v are said to be path independent if there is no dipath from u to v and there is no dipath from v to u. The set I is called a path independent set of D if any two different vertices in I are path independent. The path independence number of D is the maximum cardinality of a path independent set of D. In this research, we describe a lower bound and an upper bound of the independence number of Cayley digraphs of left groups and right groups. Some examples corresponding to those bounds are illustrated here. Furthermore, the exact value of the path independence number of Cayley digraphs of left groups and right groups are also presented.

Keywords : Cayley digraphs, independence number, left groups, path independence number, right groups
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