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Characterizations of treelike comparability graphs. (English) Zbl 1114.05087

Summary: A comparability graph is a simple graph which admits a transitive acycle orientation on its edges. Each one of such orientations defines a partial order on the vertex set, and it is said that this graph is associated with this poset. Many comparability graphs associated with particular posets have been studied. For example, comparability graphs associated with arborescence posets are known as trivially perfect graphs. These have been characterized by E. S. Wolk [Proc. Am. Math. Soc. 16, 17–20 (1965; Zbl 0137.18105)] and M. C. Golumbic [Discrete Math. 24, 105–107 (1978; Zbl 0384.05057)]. A treelike poset is a poset whose covering graph is a tree. In this article we present two characterizations of treelike comparability graphs, that is, comparability graphs which have an associated treelike poset. One of the characterizations is for general treelike graphs and the other for prime ones. The first one is based on a set of forbidden subgraphs and a forbidden configuration. The second characterization involves bouquet graphs, that is, treelike graphs with an universal vertex. Finally, we present a decision algorithm.

MSC:
05C75 Structural characterization of families of graphs
06A07 Combinatorics of partially ordered sets
05C05 Trees

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acycle orientation; poset; perfect graphs; characterizations; treelike poset; treelike graphs; forbidden configuration