Interval $k$-Orders

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Suppose $I$ is a family of intervals. If the vertices of graph $H$ correspond to the intervals of $I$ and are adjacent if and only if their corresponding intervals intersect, then $H$ is an interval graph. Now suppose $I$ is partitioned into $k$ classes. Let $G$ be the graph with vertices corresponding to the intervals of $I$ and adjacent if and only if their corresponding intervals intersect and belong to different classes; then $G$ is an interval $k$-graph. Unlike the interval graph $H$, $G$ is not necessarily the incomparability graph of an ordered set. We characterize the interval $k$-graphs that are the incomparability graphs of ordered sets and give a characterization of what we call interval $k$-orders. We also investigate the jump number and linear discrepancy of interval $k$-orders.

Keywords: interval graph, ordered set, linear discrepancy, ordered set, jump number.