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The Reversal Ratio of a Poset

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Felsner and Reuter introduced the linear extension diameter of a partially ordered set $\mathbf{P}$, denoted ${led}(\mathbf{P})$, as the maximum distance between two linear extensions of $\mathbf{P}$, where distance is defined to be the number of incomparable pairs appearing in opposite orders (reversed) in the linear extensions. In this paper, we introduce the reversal ratio $RR(\mathbf{P})$ of $\mathbf{P}$ as the ratio of the linear extension diameter to the number of (unordered) incomparable pairs. We use probabilistic techniques to provide a family of posets $\mathbf{P}_k$ on at most $k\log k$ elements for which the reversal ratio $RR(\mathbf{P}_k)\leq C/\log k$, where C is a constant. We also examine the questions of bounding the reversal ratio in terms of order dimension and width.

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