Mathematics > Combinatorics

Edge-Removal and Non-Crossing Perfect Matchings

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We study the following problem - How many arbitrary edges can be removed from a complete geometric graph with 2n vertices such that the resulting graph always contains a perfect non-crossing matching? We first address the case where the boundary of the convex hull of the original graph contains at most $n + 1$ points. In this case we show that n edges can be removed, one more than the general case. In the second part we establish a lower bound for the case where the $2n$ points are randomly chosen. We prove that with probability which tends to 1, one can remove any $n + \Theta(n/log (n))$ edges but the residual graph will still contain a non-crossing perfect matching. We also discuss the upper bound for the number of arbitrary edges one must remove in order to eliminate all the non-crossing perfect matchings.

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