Aichholzer, Oswin; Bereg, Sergey; Dumitrescu, Adrian; García, Alfredo; Huemer, Clemens; Hurtado, Ferran; Kano, Mikio; Márquez, Alberto; Rappaport, David; Smorodinsky, Shakhar; Souvaine, Diane; Urrutia, Jorge; Wood, David R.


Summary: This paper studies non-crossing geometric perfect matchings. Two such perfect matchings are compatible if they have the same vertex set and their union is also non-crossing. Our first result states that for any two perfect matchings $M$ and $M'$ of the same set of $n$ points, for some $k \in O(\log n)$, there is a sequence of perfect matchings $M = M_0, M_1, \ldots, M_k = M'$, such that each $M_i$ is compatible with $M_{i+1}$. This improves the previous best bound of $k \leq n - 2$. We then study the conjecture: every perfect matching with an even number of edges has an edge-disjoint compatible perfect matching. We introduce a sequence of stronger conjectures that imply this conjecture, and prove the strongest of these conjectures in the case of perfect matchings that consist of vertical and horizontal segments. Finally, we prove that every perfect matching with $n$ edges has an edge-disjoint compatible matching with approximately $4n/5$ edges.

MSC:

05C62 Graph representations (geometric and intersection representations, etc.)
05C10 Planar graphs; geometric and topological aspects of graph theory
05C70 Edge subsets with special properties (factorization, matching, partitioning, covering and packing, etc.)
52B55 Computational aspects related to convexity
68R10 Graph theory (including graph drawing) in computer science
68U05 Computer graphics; computational geometry (digital and algorithmic aspects)

Keywords:
geometric graph; compatible matching; convex-hull-connected segments; convexly independent segments; segments in convex position

Full Text: DOI arXiv

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