

Extending partial contact representations of planar graphs

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(joint work with Paul Dorbec and Mickael Montassier)

The question of extending partial representations of graphs by intersections of various types of geometric objects has recently been studied for several intersection defined graph classes. In most cases the problems are of the same complexity as the recognition of the relevant classes of graphs (i.e., when no vertices are pre-represented). We show that in case of contact representations the picture is different.

It is known that every planar graph is a contact graph of triangles in the plane, and every planar bipartite planar graph is a contact graph of vertical and horizontal line segments. We prove that in both cases the question becomes NP-complete if some vertices come pre-represented. On the positive side, we show that in the case of bipartite graphs, if all vertices of one color class are pre-represented by disjoint parallel line segments, one can decide in polynomial time if the remaining vertices can be represented by segments perpendicular to them so that to obtain a contact representation of the given graph.