

# Fixed Parameter Algorithms for Completion Problems on Planar Graphs<sup>1</sup>

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## Abstract:

Given a partial relation  $\leq$  on graphs we consider the PLANE  $\leq$ -COMPLETION ( $\leq$ -PC) problem which, given a (possibly disconnected) plane graph  $G$  and a connected plane graph  $H$ , asks whether it is possible to add edges in  $G$  such that the resulting graph  $G^+$  remains plane and  $H \leq G^+$ . We consider instantiations of this general problem when  $\leq$  is the (embedded) subgraph relation, the (embedded) induced subgraph relation, the (embedded) topological minor relation, and the (embedded) minor relation and we prove that all of them admit fixed parameter algorithms when parameterized by the size of  $H$ .

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