

**Title:** Local tree-width, excluded minors, and approximation algorithms

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**Abstract:** The local tree-width of a graph  $G=(V,E)$  is the function  $ltw^G: \mathbb{N} \rightarrow \mathbb{N}$  that associates with every natural number  $r$  the maximal tree-width of an  $r$ -neighborhood in  $G$ . Our main graph theoretic result is a decomposition theorem for graphs with excluded minors that essentially says that such graphs can be decomposed into trees of graphs of bounded local tree-width. As an application of this theorem, we show that a number of combinatorial optimization problems, such as Minimum Vertex Cover, Minimum Dominating Set, and Maximum Independent Set have a polynomial time approximation scheme when restricted to a class of graphs with an excluded minor.

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