

**Robertson, Neil; Seymour, P. D.**

**Graph minors. II. Algorithmic aspects of tree-width.** (English) Zbl 0611.05017  
*J. Algorithms* 7, 309-322 (1986).

[For part I see the authors' paper in *J. Comb. Theory* 35, 39-61 (1983; [Zbl 0521.05062](#)).]

We introduce an invariant of graphs called the tree-width, and use it to obtain a polynomially bounded algorithm to test if a graph has a subgraph contractible to  $H$ , where  $H$  is any fixed planar graph. We also nonconstructively prove the existence of a polynomial algorithm to test if a graph has tree-width  $\leq w$ , for fixed  $w$ . Neither of these is a practical algorithm, as the exponents of the polynomials are large. Both algorithms are derived from a polynomial algorithm for the DISJOINT CONNECTING PATHS problem (with the number of paths fixed), for graphs of bounded tree-width.

**MSC:**

- [05C05](#) Trees
- [05C10](#) Planar graphs; geometric and topological aspects of graph theory
- [05C38](#) Paths and cycles
- [68R10](#) Graph theory (including graph drawing) in computer science

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**Keywords:**

[contractability](#); [tree-width](#); [polynomially bounded algorithm](#); [planar graph](#); [polynomial algorithm](#)

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