

Robertson, Neil; Seymour, P. D.

Graph minors. VII: Disjoint paths on a surface. (English) Zbl 0658.05044
J. Comb. Theory, Ser. B 45, No. 2, 212-254 (1988).

[For part VI see *ibid.* 41, 115-138 (1986; [Zbl 0598.05042](#)).]

Continuing their series of nonconstructive proofs of polynomial solvability of problems, the authors here address the following “homoplasty problem”.

Let Σ be a compact surface, eventually with boundary. Two graphs in Σ are homoplastic iff there exists a homeomorphism of Σ , leaving its boundary invariant, and transforming one into a graph which is pathwise homotopic to the other. The “homoplasty problem” is to decide whether for given graph G and forest H in Σ there exists a subgraph of G homoplastic to H .

After proving several sufficient conditions for the homoplasty property to hold, mainly by way of geometric topology techniques, it is shown how these may be used to obtain a polynomial decision algorithm for the homoplasty problem for fixed surface Σ and forest H in Σ . It then follows that for any surface Σ and integer k the following disjoint connecting paths problem is polynomially solvable: given a graph G in Σ and k pairs of vertices $s(\text{sub } i)$, $t(\text{sub } i)$ ($1 \leq i \leq k$) of G , decide whether there exist k vertex-disjoint paths of G linking each of these pairs.

Reviewer: [F.Plastria](#)

MSC:

[05C10](#) Planar graphs; geometric and topological aspects of graph theory
[05C38](#) Paths and cycles
[68Q25](#) Analysis of algorithms and problem complexity
[05C99](#) Graph theory

Cited in **6** Reviews
Cited in **63** Documents

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References:

- [1] Kosniowski, C, ()
- [2] Levine, H.I, Homotopic curves on surfaces, (), 986-990 · [Zbl 0117.17104](#)
- [3] Robertson, N; Seymour, P.D, Graph minors. III. planar tree-width, J. combin. theory ser. B, 36, 49-64, (1984) · [Zbl 0548.05025](#)
- [4] Robertson, N; Seymour, P.D, Graph minors. VI. disjoint paths across a disc, J. combin. theory ser. B, 41, 115-138, (1986) · [Zbl 0598.05042](#)
- [5] [\scN. Robertson and P. D. Seymour](#), Graph minors. VIII. A Kuratowski theorem for general surfaces, [\textit{J. Combin. Theory Ser. B}](#), to appear. · [Zbl 0719.05033](#)
- [6] [\scN. Robertson and P. D. Seymour](#), Graph minors. XIII. The disjoint paths problem, in preparation. · [Zbl 0823.05038](#)
- [7] Schurle, A.W, ()

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