



GRAPH MINORS: STRUCTURE THEORY AND ALGORITHMS

Progress report on project number N00014-93-1-0325

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This report covers the period from 1 February 1993 through 30 April 1993. The following has been done during this period.

- (i) The case $n = 6$ of Hadwiger's conjecture. This research was carried out prior to the commencement of the grant; a revised version of paper [1] was prepared.
- (ii) Rooted subdivisions of K_4 . With Neil Robertson, the PI worked on the following problem: Given a graph G and four vertices of G , when does there exist a K_4 -subdivision with nodes ("branch-vertices") precisely the four given vertices? Applications of this range from pure graph theory (Dirac's conjecture, Hajos' conjecture, Kelmans' conjecture) to applied problems such as efficient call routing. This is work in progress, so far we have concentrated on planar graphs.
- (iii) Obstructions to tree-width four. With my student Daniel Sanders we have been trying to find the minor-minimal graphs of tree-width 5. We have managed to find 52 such graphs, and are developing a method for finding all of them. This is based on minor-preserving reductions, which is related to Dan's thesis topic.
- (iv) Dan Sanders has written (under my supervision) paper [2], where he proves a special case of a conjecture of Lovasz that in a 5-connected graph, any five independent edges are contained in a simple circuit, unless they form a cut.
- (v) Dan Sanders has also been working on his thesis topic, which is linear-time algorithm to test if a graph has tree-width four. This is expected to have practical applications, because many networks arising in practice have been noticed to have small tree-width.

References

1. N.Robertson, P.D.Seymour and R.Thomas, Hadwiger's conjecture for K_6 -free graphs, submitted.
2. Daniel P. Sanders, Circuits through five edges in 5-connected graphs, submitted.

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