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Publications:

Chords in longest cycles
If a graph $G$ is 3-connected and has minimum degree at least 4, then some longest cycle in $G$ has a chord. If $G$ is 2-connected and cubic, then every longest cycle in $G$ has a chord.

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Cycles through all finite vertex sets in infinite graphs

A closed curve in the Freudenthal compactification $|G|$ of an infinite locally finite graph $G$ is called a Hamiltonian curve if it meets every vertex of $G$ exactly once (and hence it meets every end at least once). We prove that $|G|$ has a Hamiltonian curve if and only if every finite vertex set of $G$ is contained in a cycle of $G$. We apply this to extend a number of results and conjectures on finite graphs to Hamiltonian curves in infinite locally finite graphs. For example, Barnette’s conjecture (that every finite planar cubic 3-connected bipartite graph is Hamiltonian) is equivalent to the statement that every one-ended planar cubic 3-connected bipartite graph has a Hamiltonian curve. It is also equivalent to the statement that every planar cubic 3-connected bipartite graph with a nowhere-zero 3-flow (with no restriction on the number of ends) has a Hamiltonian curve. However, there are 7-ended planar cubic 3-connected bipartite graphs that do not have a Hamiltonian curve.

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Authors: Kundgen, A. (Intern), Li, B. (Ekstern), Thomassen, C. (Intern)
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Matching and Compression of Strings with Automata and Word Packing

Dynamic Relative Compression, Dynamic Partial Sums, and Substring Concatenation Given a static reference string $R$ and a source string $S$, a relative compression of $S$ with respect to $R$ is an encoding of $S$ as a sequence of references to substrings of $R$. Relative compression schemes are a classic model of compression and have recently proved very successful for compressing highly-repetitive massive data sets such as genomes and web-data. We initiate the study of relative compression in a dynamic setting where the compressed source string $S$ is subject to edit operations. The goal is to maintain the compressed representation compactly, while supporting edits and allowing efficient random access to the (uncompressed) source string. We present new data structures that achieve optimal time for updates and queries while using space linear in the size of the optimal relative compression, for nearly all combinations of parameters. We present solutions for restricted and extended sets of updates. To achieve these results, we revisit the dynamic partial sums problem and the substring concatenation problem. We present new optimal or near optimal bounds for these problems. Plugging in our new results we also immediately obtain new bounds for the string indexing for patterns with wildcards problem and the dynamic text and static pattern matching problem. Subsequence Automata with Default
Transitions Let $S$ be a string of length $n$ with characters from an alphabet of size $k$. The subsequence automaton of $S$ (often called the directed acyclic subsequence graph) is the minimal deterministic finite automaton accepting all subsequences of $S$. A straightforward construction shows that the size (number of states and transitions) of the subsequence automaton is $O(n)$ and that this bound is asymptotically optimal. In this paper, we consider subsequence automata with default transitions, that is, special transitions to be taken only if none of the regular transitions match the current character, and which do not consume the current character. We show that with default transitions, much smaller subsequence automata are possible, and provide a full trade-off between the size of the automaton and the delay, i.e., the maximum number of consecutive default transitions followed before consuming a character. Specifically, given any integer parameter $k$, $1 < k$, we present a subsequence automaton with default transitions of size $O(nk \log k)$ and delay $O(\log k)$. Hence, with $k = 2$ we obtain an automaton of size $O(n \log n)$ and delay $O(\log n)$. At the other extreme, with $k = n$, we obtain an automaton of size $O(n)$ and delay $O(1)$, thus matching the bound for the standard subsequence automaton construction. Finally, we generalize the result to multiple strings. The key component of our result is a novel hierarchical automata construction of independent interest.

Deterministic Indexing for Packed Strings Given a string $S$ of length $n$, the classic string indexing problem is to preprocess $S$ into a compact data structure that supports efficient subsequent pattern queries. In the deterministic variant the goal is to solve the string indexing problem without any randomization (at preprocessing time or query time). In the packed variant the strings are stored with several character in a single word, giving us the opportunity to read multiple characters simultaneously. Our main result is a new string index in the deterministic and packed setting. Given a packed string $S$ of length $n$ over an alphabet $\Sigma$, we show how to preprocess $S$ in $O(n)$ time and space $O(n)$ such that given a packed pattern string of length $m$ we can support queries in (deterministic) time $O(m^2 + \log m + \log w)$, where $w = \log n$ is the number of characters packed in a word of size $w = (\log n)$. Our query time is always at least as good as the previous best known bounds and whenever several characters are packed in a word, i.e., $\log w$, the query times are faster. Dynamic Partial Sums in Constant Time and Succinct Space with the Ultra Wide Word-RAM Model The dynamic partial sums problem is to dynamically maintain an array of $n$ integers while supporting efficient access, update and partial sums queries. This classic problem, and its variations, are very well studied in many different computational models [Fre82,FS89,Fen94, HSS11, HR03, HRS96,RRR01, PD04]. We solve the partial sums problem in the ultra wide word-RAM model, recently introduced by Farzan et al. [FLONS15], where we, in constant time, are allowed to manipulate words of size $w$ and access $w$ memory locations. Farzan et al. [FLONS15] additionally gave a solution to the dynamic partial sums problem by simulating the RAMBO model to obtain a result by Brodnik et al. [BKMN06]. In this paper we present an improved solution to the dynamic partial sums problem in the ultra wide word-RAM model that supports all operations in either constant or $O(\log \log n)$ time, depending on whether we allow multiplication, and succinct space. We pose as an open problem whether it is possible in the ultra wide word-RAM model to additionally support the classic select operation in constant time.

On the Minimum Number of Spanning Trees in $k$-Edge-Connected Graphs We show that a $k$-edge-connected graph on $n$ vertices has at least $n(k/2)^{n-1}$ spanning trees. This bound is tight if $k$ is even and the extremal graph is the $n$-cycle with edge multiplicities $k/2$. For $k$ odd, however, there is a lower bound $c_k^{n-1}$, where $c_k = k/2$. Specifically, $c_3 > 1.77$ and $c_5 > 2.75$. Not surprisingly, $c_3$ is smaller than the corresponding number for 4-edge-connected graphs. Examples show that $c_3 < 2 + 3 = 1.93$. However, we have no examples of 5-edge-connected graphs with fewer spanning trees than the $n$-cycle with all edge multiplicities (except one) equal to 3, which is almost 6-regular. We have no examples of 5-regular 5-edge-connected graphs with fewer than $3.09^{n-1}$ spanning trees, which is more than the corresponding number for 6-regular 6-edge-connected graphs. The analogous surprising phenomenon occurs for each higher odd edge connectivity and regularity.
Roots of the Chromatic Polynomial
The chromatic polynomial of a graph G is a univariate polynomial whose evaluation at any positive integer q enumerates the proper q-colourings of G. It was introduced in connection with the famous four colour theorem but has recently found other applications in the field of statistical physics. In this thesis we study the real roots of the chromatic polynomial, termed chromatic roots, and focus on how certain properties of a graph affect the location of its chromatic roots.

Firstly, we investigate how the presence of a certain spanning tree in a graph affects its chromatic roots. In particular we prove a tight lower bound on the smallest non-trivial chromatic root of a graph admitting a spanning tree with at most three leaves. Here, non-trivial means different from 0 or 1. This extends a theorem of Thomassen on graphs with Hamiltonian paths. We also prove similar lower bounds on the chromatic roots of certain minor-closed families of graphs.

Later, we study the Tutte polynomial of a graph, which contains the chromatic polynomial as a specialisation. We discuss a technique of Thomassen using which it is possible to deduce that the roots of the chromatic polynomial are dense in certain intervals. We extend Thomassen’s technique to the Tutte polynomial and as a consequence, deduce a density result for roots of the Tutte polynomial. This partially answers a conjecture of Jackson and Sokal.

Finally, we refocus our attention on the chromatic polynomial and investigate the density of chromatic roots of several graph families. In particular, we show that the chromatic roots of planar graphs are dense in the interval (3, 4), except for a small interval around \( \sqrt{5} + 2 \) \( \approx 3.618 \), where \( \sqrt{5} \) denotes the golden ratio. We also investigate the chromatic roots of related minor-closed classes of graphs and bipartite graphs.

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Spanning quadrangulations of triangulated surfaces
In this paper we study alternating cycles in graphs embedded in a surface. We observe that 4-vertex-colorability of a triangulation on a surface can be expressed in terms of spanning quadrangulations, and we establish connections between spanning quadrangulations and cycles in the dual graph which are noncontractible and alternating with respect to a perfect matching. We show that the dual graph of an Eulerian triangulation of an orientable surface other than the sphere has a perfect matching M and an M-alternating noncontractible cycle. As a consequence, every Eulerian triangulation of the torus has a nonbipartite spanning quadrangulation. For an Eulerian triangulation G of the projective plane the situation is different: If the dual graph G^* is nonbipartite, then G^* has no noncontractible alternating cycle, and all spanning quadrangulations of G are bipartite. If the dual graph G^* is bipartite, then it has a noncontractible, M-alternating cycle for some (and hence any) perfect matching, G has a bipartite spanning quadrangulation and also a nonbipartite spanning quadrangulation.

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The number of colorings of planar graphs with no separating triangles

A classical result of Birkhoff and Lewis implies that every planar graph with \( n \) vertices has at least \( \frac{152}{3}n - 1 \) distinct 5-vertex-colorings. Equality holds for planar triangulations with \( n - 4 \) separating triangles. We show that, if a planar graph has no separating triangle, then it has at least \( 2 + 10 \cdot \frac{11}{12}n \) distinct 5-vertex-colorings. A similar result holds for \( k \)-colorings for each fixed \( k \geq 5 \). Infinitely many planar graphs without separating triangles have less than \( 2.252n \) distinct 5-vertex-colorings. As an auxiliary result we provide a complete description of the infinite 6-regular planar triangulations.
The square of a planar cubic graph is 7-colorable
We prove the conjecture made by G. Wegner in 1977 that the square of every planar, cubic graph is 7-colorable. Here, 7 cannot be replaced by 6.

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Aspects of the Tutte polynomial

This thesis studies various aspects of the Tutte polynomial, especially focusing on the Merino-Welsh conjecture.

We write $T(G;x,y)$ for the Tutte polynomial of a graph $G$ with variables $x$ and $y$. In 1999, Merino and Welsh conjectured that if $G$ is a loopless 2-connected graph, then

$$T(G;1,1) \leq \max\{T(G;2,0), T(G;0,2)\}.$$

The three numbers, $T(G;1,1)$, $T(G;2,0)$ and $T(G;0,2)$ are respectively the numbers of spanning trees, acyclic orientations and totally cyclic orientations of $G$.

First, I extend Negami’s splitting formula to the multivariate Tutte polynomial. Using the splitting formula, Thomassen and I found a lower bound for the number of spanning trees in a $k$-edge-connected graph. Our bound is tight for $k$ even, but for $k$ odd we give a slightly better lower bound which we believe is not tight. We prove that the minimum number of spanning trees in a 3-edge-connected graph with $n$ vertices is, not surprisingly, significantly smaller than the minimum number of spanning trees in a 4-edge-connected graph. However, we conjecture that the minimum number of spanning trees of a 5-edge-connected graph is actually obtained by a 6-edge-connected graph asymptotically.

Thomassen proved the following partial result for the Merino-Welsh conjecture. Assume the graph $G$ is loopless, bridgeless and has $n$ vertices and $m$ edges.

If $m \leq 1.066(n-1)$ then $T(G;1,1) \leq T(G;2,0)$.
If $m \geq 4(n-1)$ then $T(G;1,1) \leq T(G;0,2)$.

I improve in this thesis Thomassen’s result as follows:

If $m \leq 1.29(n-1)$ then $T(G;1,1) \leq T(G;2,0)$.
If $m \geq 3.58(n-1)$ and $G$ is 3-edge-connected then $T(G;1,1) \leq T(G;0,2)$.

Strengthening Thomassen’s idea that acyclic orientations dominate spanning trees in sparse graphs, I conjecture that the ratio $T(G;2,0)/T(G;1,1)$ increases as $G$ gets sparser. To support this conjecture, I prove a variant of the conjecture for series-parallel graphs.

The Merino-Welsh conjecture has a stronger version claiming that the Tutte polynomial is convex on the line segment
between (2,0) and (0,2) for loopless 2-connected graphs. Chavez-Lomeli et al. proved that this holds for coloopless paving matroids, and I provide a shorter proof of their theorem. I also prove it for minimally 2-edge-connected graphs. As a general statement for the convexity of the Tutte polynomials, I show that the Tutte polynomial of a sparse paving matroid is almost surely convex in the first quadrant. In contrast, I conjecture that the Tutte polynomial of a sparse paving matroid with fixed rank is almost never convex in the first quadrant.

The following multiplicative version of the Merino-Welsh conjecture was considered by Noble and Royle:

\[ T(G;1,1)^2 \leq T(G;2,0) \cdot T(G;0,2). \]

Noble and Royle proved that this multiplicative version holds for series-parallel graphs, using a computer algorithm that they designed. Using a property of the splitting formula which I found, I improve their algorithm so that it is applicable to the class of graphs with bounded treewidth (or pathwidth). As an application, I verify that the multiplicative version holds for graphs with pathwidth at most 3.

Decomposing graphs into a constant number of locally irregular subgraphs

A graph is locally irregular if no two adjacent vertices have the same degree. The irregular chromatic index \( \chi_{irr}'(G) \) of a graph \( G \) is the smallest number of locally irregular subgraphs needed to edge-decompose \( G \). Not all graphs have such a decomposition, but Baudon, Bensmail, Przybyło, and Woźniak conjectured that if \( G \) can be decomposed into locally irregular subgraphs, then \( \chi_{irr}'(G) \leq 3 \). In support of this conjecture, Przybyło showed that \( \chi_{irr}'(G) \leq 3 \) holds whenever \( G \) has minimum degree at least 1010.

Here we prove that every bipartite graph \( G \) which is not an odd length path satisfies \( \chi_{irr}'(G) \leq 10 \). This is the first general constant upper bound on the irregular chromatic index of bipartite graphs. Combining this result with Przybyło’s result, we show that \( \chi_{irr}'(G) \leq 328 \) for every graph \( G \) which admits a decomposition into locally irregular subgraphs. Finally, we show that \( \chi_{irr}'(G) \leq 2 \) for every 16-edge-connected bipartite graph \( G \).
Graph Decompositions
The topic of this PhD thesis is graph decompositions. While there exist various kinds of decompositions, this thesis focuses on three problems concerning edgedecompositions. Given a family of graphs \( H \) we ask the following question: When can the edge-set of a graph be partitioned so that each part induces a subgraph isomorphic to a member of \( H \)? Such a decomposition is called an \( H \)-decomposition. Apart from the existence of an \( H \)-decomposition, we are also interested in the number of parts needed in an \( H \)-decomposition.

Firstly, we show that for every tree \( T \) there exists a constant \( k(T) \) such that every \( k(T) \)-edge-connected graph whose size is divisible by the size of \( T \) admits a \( T \)-decomposition. This proves a conjecture by Barát and Thomassen from 2006.

Moreover, we introduce a new arboricity notion where we restrict the diameter of the trees in a decomposition into forests. We conjecture that for every natural number \( k \) there exists a natural number \( d(k) \) such that the following holds: If \( G \) can be decomposed into \( k \) forests, then \( G \) can be decomposed into \( k + 1 \) forests in which each tree has diameter at most \( d(k) \). We verify this conjecture for \( k \leq 3 \). As an application we show that every 6-edge-connected planar graph contains two edge-disjoint 18/19 -thin spanning trees.

Finally, we make progress on a conjecture by Baudon, Bensmail, Przybyło, and Wozniak stating that if a graph can be decomposed into locally irregular graphs, then there exists such a decomposition with at most 3 parts. We show that this conjecture is true if the number 3 is replaced by 328, establishing the first constant upper bound for this problem.

General information
Let $G$ be a graph, let $\Gamma$ be an Abelian group with identity $0_{\Gamma}$, and, for each vertex $v$ of $G$, let $p(v)$ be a prescription such that $\sum_{v \in V(G)} p(v) = 0_{\Gamma}$. A $(\Gamma, p)$-flow consists of an orientation $D$ of $G$ and, for each edge $e$ of $G$, a label $f(e)$ in $\Gamma \setminus \{0_{\Gamma}\}$ such that, for each vertex $v$ of $G$,

$$\sum_{e \text{ points in to } v} f(e) - \sum_{e \text{ points out from } v} f(e) = p(v)$$

If such an orientation $D$ and labelling $f$ exists for all such $p$, then $G$ is $\Gamma$-connected.

Our main result is that if $G$ is a 5-edge-connected planar graph and $|\Gamma| \geq 3$, then $G$ is $\Gamma$-connected. This is equivalent to a dual colourability statement proved by Lai and Li (2007): planar graphs with girth at least 5 are “$\Gamma$-colourable”. Our proof is considerably shorter than theirs. Moreover, the $\Gamma$-colourability result of Lai and Li is already a consequence of Thomassen’s (2003) 3-list-colour proof for planar graphs of girth at least 5.

Our theorem (as well as the girth 5 colourability result) easily implies that every 5-edge-connected planar graph for which $|E(G)|$ is a multiple of 3 has a claw decomposition, resolving a question of Barát and Thomassen. It also easily implies the dual of Grötzsch’s Theorem, that every planar graph without 1- or 3-cut has a 3-flow; this is equivalent to Grötzsch’s Theorem.
Infinitely connected subgraphs in graphs of uncountable chromatic number

Erdős and Hajnal conjectured in 1966 that every graph of uncountable chromatic number contains a subgraph of infinite connectivity. We prove that every graph of uncountable chromatic number has a subgraph which has uncountable chromatic number and infinite edge-connectivity. We also prove that, if each orientation of a graph $G$ has a vertex of infinite outdegree, then $G$ contains an uncountable subgraph of infinite edge-connectivity.
Let $G$ be a graph and let $s$ be a vertex of $G$. We consider the structure of the set of all lifts of two edges incident with $s$ that preserve edge-connectivity. Mader proved that two mild hypotheses imply there is at least one pair that lifts, while Frank showed (with the same hypotheses) that there are at least $(\deg(s) - 1)/2$ disjoint pairs that lift. We consider the lifting graph: its vertices are the edges incident with $s$, two being adjacent if they form a liftable pair. We have three main results, the first two with the same hypotheses as for Mader's Theorem.

(i) Let $F$ be a subset of the edges incident with $s$. We show that $F$ is independent in the lifting graph of $G$ if and only if there is a single edge-cut $C$ in $G$ of size at most $r + 1$ containing all the edges in $F$, where $r$ is the maximum number of edge-disjoint paths from a vertex (not $s$) in one component of $G - C$ to a vertex (not $s$) in another component of $G - C$.

(ii) In the $k$-lifting graph, two edges incident with $s$ are adjacent if their lifting leaves the resulting graph with the property that any two vertices different from $s$ are joined by $k$ pairwise edge-disjoint paths. If both $\deg(s)$ and $k$ are even, then the $k$-lifting graph is a connected complete multipartite graph. In all other cases, there are at most two components. If there are exactly two components, then each component is a complete multipartite graph. If $\deg(s)$ is odd and there are two components, then one component is a single vertex.

(iii) Huck proved that if $k$ is odd and $G$ is $(k+1)$-edge-connected, then $G$ is weakly $k$-linked (that is, for any $k$ pairs $x_i; y_i$, there are $k$ edge-disjoint paths $P_i$ with $P_i$ joining $x_i$ and $y_i$). We use our results to extend a slight weakening of Huck's theorem to some infinite graphs: if $k$ is odd, every $(k + 2)$-edge-connected, locally finite, 1-ended, infinite graph is weakly $k$-linked.

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We give an elementary proof of the theorem of Nash-Williams that a graph has an edge-decomposition into cycles if and only if it does not contain an odd cut. We also prove that every bridgeless graph has a collection of cycles covering each edge at least once and at most 7 times. The two results are equivalent in the sense that each can be derived from the other.
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Orientations of infinite graphs with prescribed edge-connectivity

We prove a decomposition result for locally finite graphs which can be used to extend results on edge-connectivity from finite to infinite graphs. It implies that every $4k$-edge-connected graph $G$ contains an immersion of some finite $2k$-edge-connected Eulerian graph containing any prescribed vertex set (while planar graphs show that $G$ need not contain a subdivision of a simple finite graph of large edge-connectivity). Also, every $8k$-edge connected infinite graph has a $k$-arc-connected orientation, as conjectured in 1989.

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BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.288 SNIP 1.682
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.435 SNIP 1.415
Web of Science (2007): Indexed yes
The 3-flow conjecture, factors modulo k, and the 1-2-3-conjecture

Let k be an odd natural number ≥5, and let G be a (6k−7)-edge-connected graph of bipartite index at least k−1. Then, for each mapping f:V(G)→N, G has a subgraph H such that each vertex v has H-degree f(v) modulo k. We apply this to prove that, if c:V(G)→Zk is a proper vertex-coloring of a graph G of chromatic number k≥5 or k−1≥6, then each edge of G can be assigned a weight 1 or 2 such that each weighted vertex-degree of G is congruent to c modulo k. Consequently, each nonbipartite (6k−7)-edge-connected graph of chromatic number at most k (where k is any odd natural number ≥3) has an edge-weighting with weights 1,2 such that neighboring vertices have distinct weighted degrees (even after reducing these weighted degrees modulo k). We characterize completely the bipartite graph having an edge-weighting with weights 1,2 such that neighboring vertices have distinct weighted degrees. In particular, that problem belongs to P while it is NP-complete for nonbipartite graphs. The characterization also implies that every 3-edge-connected bipartite graph with at least 3 vertices has such an edge-labeling, and so does every simple bipartite graph of minimum degree at least 3.
Factors modulo k, 1-2-3-conjecture

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Destroying longest cycles in graphs and digraphs

In 1978, C. Thomassen proved that in any graph one can destroy all the longest cycles by deleting at most one third of the vertices. We show that for graphs with circumference k≤8 it suffices to remove at most 1/k of the vertices. The Petersen graph demonstrates that this result cannot be extended to include k=9 but we show that in every graph with circumference nine we can destroy all 9-cycles by removing 1/5 of the vertices. We consider the analogous problem for digraphs and show that for digraphs with circumference k=2,3, it suffices to remove 1/k of the vertices. However this does not hold for k≥4.

General information

State: Published
Organisations: Department of Applied Mathematics and Computer Science, Algorithms and Logic, University of South Africa, University of Stellenbosch, Converse College, Universidad Nacional Autonoma de Mexico, Universidad Autonoma Metropolitana
Extending a perfect matching to a Hamiltonian cycle

In 1993 Ruskey and Savage conjectured that in the d-dimensional hypercube, every matching $M$ can be extended to a Hamiltonian cycle. Fink verified this for every perfect matching $M$, remarkably even if $M$ contains external edges. We prove that this property also holds for sparse spanning regular subgraphs of the cubes: for every $d \geq 7$ and every $k$, where $7 \geq k \geq d$, the $d$-dimensional hypercube contains a $k$-regular spanning subgraph such that every perfect matching (possibly with external edges) can be extended to a Hamiltonian cycle. We do not know if this result can be extended to $k = 4; 5; 6$. It cannot be extended to $k = 3$. Indeed, there are only three 3-regular graphs such that every perfect matching (possibly with external edges) can be extended to a Hamiltonian cycle, namely the complete graph on 4 vertices, the complete bipartite 3-regular graph on 6 vertices and the 3-cube on 8 vertices. Also, we do not know if there are graphs of girth at least 5 with this matching-extendability property.
The minimum number of minimal codewords in an \([n,k]\)-code and in graphic codes

We survey some lower bounds on the function in the title based on matroid theory and address the following problem by Dosa et al. (2004): Determine the smallest number of circuits in a loopless matroid with no parallel elements and with a given size and rank. In the graphic 3-connected case we provide a lower bound which is a product of a linear function of the number of vertices and an exponential function of the average degree. We also prove that, for \(p \geq 38\), every 3-connected graph with \(p\) vertices has at least as many cycles as the wheel with \(p\) vertices.
Erratum to: Commentary for "On planarity of compact, locally connected, metric spaces": (2011), 31, 3 (365-376)

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, University of Waterloo
Authors: Richter, R. B. (Ekstern), Rooney, B. (Ekstern), Thomassen, C. (Intern)
Pages: 253-254
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Main Research Area: Technical/natural sciences

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Journal: Combinatorica
Volume: 34
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ISSN (Print): 0209-9683
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 0.91 SJR 1.204 SNIP 1.603
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.181 SNIP 2.011 CiteScore 1.06
Graph factors modulo $k$

We prove a general result on graph factors modulo $k$. A special case says that, for each natural number $k$, every $(12k-7)$-edge-connected graph with an even number of vertices contains a spanning subgraph in which each vertex has degree congruent to $k$ modulo $2k$.

General information
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Algorithms and Logic, King Abdulaziz University
Authors: Thomassen, C. (Intern)
Pages: 174-177
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 106
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Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.208 SNIP 1.627
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.613 SNIP 2.034
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.665 SNIP 2.512
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.518 SNIP 1.975
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.163 SNIP 1.974
Scopus rating (2005): SJR 1.431 SNIP 1.48
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.856 SNIP 2.168
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.81 SNIP 1.538
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.757 SNIP 1.847
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 2.866 SNIP 1.749
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.098 SNIP 1.332
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.913 SNIP 1.621
Group flow, complex flow, unit vector flow, and the \((2+)\)-flow conjecture

If \(F\) is a (possibly infinite) subset of an abelian group \(\Gamma\), then we define \(f(F, \Gamma)\) as the smallest natural number such that every \(f(F, \Gamma)\)-edge-connected (finite) graph \(G\) has a flow where all flow values are elements in \(F\). We prove that \(f(F, \Gamma)\) exists if and only if some odd sum of elements in \(F\) equals some even sum. We discuss various instances of this problem. We prove that every 6-edge-connected graph has a flow whose flow values are the three roots of unity in the complex plane. If the edge-connectivity 6 can be reduced, then it can be reduced to 4, and the 3-flow conjecture follows. We prove that every 14-edge-connected graph has a flow whose flow values are the five roots of unity in the complex plane. Any such flow is balanced modulo 5. So, if the edge-connectivity 14 can be reduced to 9, then the 5-flow conjecture follows, as observed by F. Jaeger. We use vector flow to prove that, for each odd natural number \(k\), every \((3k-1)\)-edge-connected graph has a collection of \(k\) even subgraphs such that every edge is in precisely \(k-1\) of them. Finally, the flow result gives a considerable freedom to prescribe the flow values in the \((2+)\)-flow conjecture by L. Goddyn and P. Seymour. For example, if \(k\) is a natural number and \(G\) is a 6\(k\)-edge-connected graph, then \(G\) has a flow with flow values 1, 1+1\(/k\). It also has, for any irrational number , a flow with flow values 1, 1+, 1++1\(/k\).
Strongly 2-connected orientations of graphs

We prove that a graph admits a strongly 2-connected orientation if and only if it is 4-edge-connected, and every vertex-deleted subgraph is 2-edge-connected. In particular, every 4-connected graph has such an orientation while no cubic 3-connected graph has such an orientation.

General information
State: Published
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Journal: Journal of Combinatorial Theory. Series B
Volume: 110
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Decomposing a graph into bistars

Bárat and the present author conjectured that, for each tree $T$, there exists a natural number $k_T$ such that the following holds: If $G$ is a $k_T$-edge-connected graph such that $|E(T)|$ divides $|E(G)|$, then $G$ has a $T$-decomposition, that is, a decomposition of the edge set into trees each of which is isomorphic to $T$. The conjecture has been verified for infinitely
many paths and for each star. In this paper we verify the conjecture for an infinite family of trees that are neither paths nor stars, namely all the bistars $S(k,k+1)$.

**General information**
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Organisations: Department of Applied Mathematics and Computer Science, Algorithms and Logic
Authors: Thomassen, C. (Intern)
Pages: 504-508
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Main Research Area: Technical/natural sciences

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BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.208 SNIP 1.627
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.613 SNIP 2.034
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.665 SNIP 2.512
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.518 SNIP 1.975
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.163 SNIP 1.974
Scopus rating (2005): SJR 1.431 SNIP 1.48
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.856 SNIP 2.168
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.81 SNIP 1.538
Decomposing graphs into paths of fixed length

Barát and Thomassen have conjectured that, for any fixed tree \( T \), there exists a natural number \( k_T \) such that the following holds: if \( G \) is a \( k_T \)-edge-connected graph such that \( |E(T)| \) divides \( |E(G)| \), then \( G \) has a \( T \)-decomposition. The conjecture is trivial when \( T \) has one or two edges. Before submission of this paper, the conjecture had been verified only for two other trees: the paths of length 3 and 4, respectively. In this paper we verify the conjecture for each path whose length is a power of 2.
Nowhere-zero 3-flows and modulo k-orientations

The main theorem of this paper provides partial results on some major open problems in graph theory, such as Tutte’s 3-flow conjecture (from the 1970s) that every 4-edge connected graph admits a nowhere-zero 3-flow, the conjecture of Jaeger, Linial, Payan and Tarsi (1992) that every 5-edge-connected graph is $Z_3$-connected, Jaeger’s circular flow conjecture (1984) that for every odd natural number $k \geq 3$, every $(2k-2)$-edge-connected graph has a modulo $k$-orientation, etc. It was proved recently by Thomassen that, for every odd number $k$, every $(2k^2+k)$-edge-connected graph $G$ has a modulo $k$-orientation; and every 8-edge-connected graph $G$ is $Z_3$-connected and admits therefore a nowhere-zero 3-flow.

In the present paper, Thomassen’s method is refined to prove the following: For every odd number $k$, every $(3k-3)$-edge-connected graph has a modulo $k$-orientation. As a special case of the main result, every 6-edge-connected graph is $Z_3$-connected and admits therefore a nowhere-zero 3-flow. Note that it was proved by Kochol (2001) that it suffices to prove the 3-flow conjecture for 5-edge-connected graphs.
The maximum number of minimal codewords in an \([n, k]\)-code
We survey some upper and lower bounds on the function in the title, and make them explicit for \(n\leq15\) and \(1\leq k\leq15\). Exact values are given for cycle codes of graphs for \(3\leq n\leq15\) and \(1\leq k\leq13\).

**General information**
State: Published
Organisations: Department of Applied Mathematics and Computer Science, Algorithms and Logic, King Abdulaziz University, University of Otago, Nanyang Technological University, Télécom ParisTech
Authors: Alahmadi, A. (Ekstern), Aldred, R. E. L. (Ekstern), de la Cruz, R. (Ekstern), Solé, P. (Ekstern), Thomassen, C. (Intern)
Pages: 1569-1574
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Main Research Area: Technical/natural sciences

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Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.72 SJR 0.925 SNIP 1.005
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.933 SNIP 1.104 CiteScore 0.64
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.03 SNIP 1.211 CiteScore 0.68
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.005 SNIP 1.243 CiteScore 0.74
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.965 SNIP 1.193 CiteScore 0.7
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.875 SNIP 0.986 CiteScore 0.66
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.875 SNIP 1.032
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.925 SNIP 1.301
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.942 SNIP 1.36
Scopus rating (2007): SJR 1.035 SNIP 1.194
Scopus rating (2006): SJR 0.912 SNIP 1.072
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.854 SNIP 1.048
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.817 SNIP 0.968
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.789 SNIP 0.848
Scopus rating (2002): SJR 0.834 SNIP 1.232
The maximum number of minimal codewords in long codes

Upper bounds on the maximum number of minimal codewords in a binary code follow from the theory of matroids. Random coding provides lower bounds. In this paper, we compare these bounds with analogous bounds for the cycle code of graphs. This problem (in the graphic case) was considered in 1981 by Entringer and Slater who asked if a connected graph with $p$ vertices and $q$ edges can have only slightly more than $2q-p$ cycles. The bounds in this note answer this in the affirmative for all graphs except possibly some that have fewer than $2p+3\log_2(3p)$ edges. We also conclude that an Eulerian (even and connected) graph has at most $2q-p$ cycles unless the graph is a subdivision of a 4-regular graph that is the edge-disjoint union of two Hamiltonian cycles, in which case it may have as many as $2q-p+p$ cycles.

General information

State: Published
Organisations: Department of Informatics and Mathematical Modeling, Department of Mathematics, Discrete mathematics, King Abdullah University, University of Otago, Nanyang Technological University
Authors: Alahmadi, A. (Ekstern), Aldred, R. (Ekstern), dela Cruz, R. (Ekstern), Solé, P. (Ekstern), Thomassen, C. (Intern)
Pages: 424-429
Publication date: 2013
Main Research Area: Technical/natural sciences

Publication information

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Volume: 161
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BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1 SJR 0.823 SNIP 1.17
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.795 SNIP 1.164 CiteScore 0.89
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.902 SNIP 1.396 CiteScore 0.99
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.762 SNIP 1.451 CiteScore 1.03
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.8 SNIP 1.35 CiteScore 1
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.846 SNIP 1.206 CiteScore 1.01
From the plane to higher surfaces

We show that Grötzsch’s theorem extends to all higher surfaces in the sense that every triangle-free graph on a surface of Euler genus \( g \) becomes 3-colorable after deleting a set of at most \( 1000 \cdot g \cdot f(g) \) vertices where \( f(g) \) is the smallest edge-width which guarantees a graph of Euler genus \( g \) and girth 5 to be 3-colorable. We derive this result from a general cutting technique which we also use to extend other results on planar graphs to higher surfaces in the same spirit, even after deleting only \( 1000g \) vertices. These include the 5-list-color theorem, results on arboricity, and various types of colorings, and decomposition theorems of planar graphs into two graphs with prescribed degeneracy properties. It is not known if the 4-color theorem extends in this way.

General information
State: Published
Organisations: Department of Mathematics, Discrete mathematics, National Institute of Informatics
Authors: Kawarabayashi, K. (Ekstern), Thomassen, C. (Intern)
Pages: 852-868
Publication date: 2012
Main Research Area: Technical/natural sciences

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Journal: Journal of Combinatorial Theory. Series B
Volume: 102
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ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
We consider the questions: How many longest cycles must a cubic graph have, and how many may it have? For each \( k \geq 2 \) there are infinitely many \( p \) such that there is a cubic graph with \( p \) vertices and precisely one longest cycle of length \( p-k \). On the other hand, if \( G \) is a graph with \( p \) vertices, all of which have odd degree, and its longest cycle has length \( p-1 \), then it has a second (but not necessarily a third) longest cycle. We present results and conjectures on the maximum number of cycles in cubic multigraphs of girth 2, 3, 4, respectively. For cubic cyclically 5-edge-connected graphs we have no conjecture but, we believe that the generalized Petersen graphs \( P(n, k) \) are relevant. We enumerate the Hamiltonian and almost Hamiltonian cycles in each \( P(n, 2) \). Curiously, there are many of one type if and only there are few of the other. If \( n \) is odd, then \( P(2n, 2) \) is a covering graph of \( P(n, 2) \). (For example, the dodecahedron graph is a covering graph of the Petersen graph). Another curiosity is that one of these has many (respectively few) Hamiltonian cycles if and only if the
other has few (respectively many) almost Hamiltonian cycles.

The weak 3-flow conjecture and the weak circular flow
We show that, for each natural number $k>1$, every graph (possibly with multiple edges but with no loops) of edge-connectivity at least $2k^2+k$ has an orientation with any prescribed outdegrees modulo $k$ provided the prescribed
outdegrees satisfy the obvious necessary conditions. For k=3 the edge-connectivity 8 suffices. This implies the weak 3-flow conjecture proposed in 1988 by Jaeger (a natural weakening of Tutte's 3-flow conjecture which is still open) and also a weakened version of the more general circular flow conjecture proposed by Jaeger in 1982. It also implies the tree-decomposition conjecture proposed in 2006 by Bárat and Thomassen when restricted to stars. Finally, it is the currently strongest partial result on the (2+)-flow conjecture by Goddyn and Seymour.

General information
State: Published
Organisations: Department of Mathematics, Discrete mathematics
Authors: Thomassen, C. (Intern)
Pages: 521-529
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Volume: 102
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BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.208 SNIP 1.627
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.613 SNIP 2.034
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.665 SNIP 2.512
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.518 SNIP 1.975
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.163 SNIP 1.974
Scopus rating (2005): SJR 1.431 SNIP 1.48
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.856 SNIP 2.168
Robertson ([5]) and independently, Bondy ([1]) proved that the generalized Petersen graph P(n, 2) is non-hamiltonian if n equivalent to 5 (mod 6), while Thomason [7] proved that it has precisely 3 hamiltonian cycles if n equivalent to 3 (mod 6). The hamiltonian cycles in the remaining generalized Petersen graphs were enumerated by Schwenk [6]. In this note we give a short unified proof of these results using Grinberg's theorem.
On planarity of compact, locally connected, metric spaces

Independently, Claytor [Ann. Math. 35 (1934), 809–835] and Thomassen [Combinatorica 24 (2004), 699–718] proved that a 2-connected, compact, locally connected metric space is homeomorphic to a subset of the sphere if and only if it does not contain K 5 or K 3,3. The “thumbtack space” consisting of a disc plus an arc attaching just at the centre of the disc shows the assumption of 2-connectedness cannot be dropped. In this work, we introduce “generalized thumbtacks” and show that a compact, locally connected metric space is homeomorphic to a subset of the sphere if and only if it does not contain K 5, K 3,3, or any generalized thumbtack, or the disjoint union of a sphere and a point.

General information

State: Published
Organisations: Discrete mathematics, Department of Mathematics, University of Waterloo
Authors: Richter, R. B. (Ekstern), Rooney, B. (Ekstern), Thomassen, C. (Intern)
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BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 0.91 SJR 1.204 SNIP 1.603
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.181 SNIP 2.011 CiteScore 1.06
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.265 SNIP 1.49 CiteScore 0.86
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
On the complexity of some colorful problems parameterized by treewidth

In this paper, we study the complexity of several coloring problems on graphs, parameterized by the treewidth of the graph. 1. The List Coloring problem takes as input a graph $G$, together with an assignment to each vertex $v$ of a set of colors $C^v$. The problem is to determine whether it is possible to choose a color for vertex $v$ from the set of permitted colors $C^v$, for each vertex, so that the obtained coloring of $G$ is proper. We show that this problem is W[1]-hard, parameterized by the treewidth of $G$. The closely related Precoloring Extension problem is also shown to be W[1]-hard, parameterized by treewidth. 2. An equitable coloring of a graph $G$ is a proper coloring of the vertices where the numbers of vertices having any two distinct colors differs by at most one. We show that the problem is hard for W[1], parameterized by the treewidth plus the number of colors. We also show that a list-based variation, List Equitable Coloring is W[1]-hard for forests, parameterized by the number of colors on the lists. 3. The list chromatic number $\chi_l(G)$ of a graph $G$ is defined to be the smallest positive integer $r$, such that for every assignment to the vertices $v \in G$ of a list $L^v$ of colors, where each list has length at least $r$, there is a choice of one color from each vertex list $L^v$ yielding a proper coloring of $G$. We show that the problem of determining whether $\chi_l(G) =$

General information

State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Fellows, M. R. (Ekstern), Fomin, F. V. (Ekstern), Lokshtanov, D. (Ekstern), Rosamond, F. (Ekstern), Saurabh, S. (Ekstern), Szeider, S. (Ekstern), Thomassen, C. (Intern)
Rainbow paths with prescribed ends

It was conjectured in [S. Akbari, F. Khaghanpoor, and S. Moazzeni. Colorful paths in vertex coloring of graphs. Preprint] that, if G is a connected graph distinct from C-7, then there is a \( \chi(G) \)-coloring of G in which every vertex \( v \) is an element of \( V(G) \) is an initial vertex of a path \( P \) with \( \chi(G) \) vertices whose colors are different. In [S. Akbari, V. Liaghat, and A. Nikzad. Colorful paths in vertex coloring of graphs. Electron. J. Combin. 18(1):P17, 9pp, 2011] this was proved with left perpendicular \( \chi(G)/2 \) right perpendicular vertices instead of \( \chi(G) \) vertices. We strengthen this to \( \chi(G) - 1 \) vertices. We also prove that every connected graph with at least one edge has a proper k-coloring (for some k) such that every vertex of color i has a neighbor of color \( i + 1 \) (mod k). C-5 shows that k may have to be greater than the chromatic number. However, if the graph is connected, infinite and locally finite, and has finite chromatic number, then the k-coloring exists for every \( k \geq \chi(G) \). In fact, the k-coloring can be chosen such that every vertex is a starting vertex of an infinite path such that the color increases by 1 (mod k) along each edge. The method is based on the circular chromatic number \( \chi_c(G) \). In particular, we verify the above conjecture for all connected graphs whose circular chromatic number equals the chromatic number.

General information

State: Published
Organisations: Discrete mathematics, Department of Mathematics, Shahrood University of Technology, Institute for Advanced Studies in Basic Sciences
Authors: Alishahi, M. (Ekstern), Taherkhani, A. (Ekstern), Thomassen, C. (Intern)
Pages: P86
Publication date: 2011
Main Research Area: Technical/natural sciences

Publication information
Journal: The Electronic Journal of Combinatorics
Volume: 18
Issue number: 1
ISSN (Print): 1077-8926
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.53
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 0.52
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 0.52
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 0.61
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.53
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 0.65
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2008): BFI-level 1
Original language: English
Rainbow path, Circular coloring, Chromatic number

Electronic versions:
v181p86[1].pdf
Source: orbit
Source-ID: 313676
Switchings, extensions, and reductions in central digraphs

A directed graph is called central if its adjacency matrix $A$ satisfies the equation $A^2=J$, where $J$ is the matrix with a 1 in each entry. It has been conjectured that every central directed graph can be obtained from a standard example by a sequence of simple operations called switchings, and also that it can be obtained from a smaller one by an extension. We disprove these conjectures and present a general extension result which, in particular, shows that each counterexample extends to an infinite family.
Decomposing a planar graph of girth 5 into an independent set and a forest

We use a list-color technique to extend the result of Borodin and Glebov that the vertex set of every planar graph of girth at least 5 can be partitioned into an independent set and a set which induces a forest. We apply this extension to also extend Grötzsch's theorem that every planar triangle-free graph is 3-colorable. Let $G$ be a plane graph. Assume that the distance between any two triangles is at least 4. Assume also that each triangle contains a vertex such that this vertex is on the outer face boundary and is not contained in any 4-cycle. Then $G$ has chromatic number at most 3. Note that, in this extension of Grötzsch's theorem an unbounded number of triangles are allowed.

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics, National Institute of Informatics
The chromatic polynomial and list colorings

We prove that, if a graph has a list of $k$ available colors at every vertex, then the number of list-colorings is at least the chromatic polynomial evaluated at $k$ when $k$ is sufficiently large compared to the number of vertices of the graph.
2-list-coloring planar graphs without monochromatic triangles

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 1337-1348
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 98
Issue number: 6
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
Decompositions of highly connected graphs into paths of length 3

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 286-292
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Graph Theory
Volume: 58
ISSN (Print): 0364-9024
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 0.71 SJR 1.084 SNIP 1.272
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.551 SNIP 1.597 CiteScore 0.85
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.37 SNIP 1.15 CiteScore 0.73
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.656 SNIP 1.705 CiteScore 0.9
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.485 SNIP 1.464 CiteScore 0.79
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.235 SNIP 1.225 CiteScore 0.76
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.303 SNIP 1.191
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.839 SNIP 1.53
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.717 SNIP 1.908
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.567 SNIP 1.49
Scopus rating (2006): SJR 1.316 SNIP 1.178
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.654 SNIP 0.838
Scopus rating (2004): SJR 1.083 SNIP 1.643
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.654 SNIP 1.183
Scopus rating (2002): SJR 1.046 SNIP 1.465
Scopus rating (2001): SJR 2.069 SNIP 1.596
Scopus rating (2000): SJR 1.038 SNIP 1.21
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.452 SNIP 1.104
Original language: English
DOIs: 10.1002/jgt.20311
Source: orbit
Source-ID: 222270
Publication: Research - peer-review › Journal article – Annual report year: 2008

**Edge-decompositions of highly connected graphs into paths**

**General information**
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 17-26
Publication date: 2008
Main Research Area: Technical/natural sciences

**Publication information**
Journal: Universitaet Hamburg, Mathematisches Seminar. Abhandlungen
Volume: 78
Graph-like continua, augmenting arcs, and Menger's theorem

We show that an adaptation of the augmenting path method for graphs proves Menger's Theorem for wide classes of topological spaces. For example, it holds for locally compact, locally connected, metric spaces, as already known. The method lends itself particularly well to another class of spaces, namely the locally arcwise connected, hereditarily locally connected, metric spaces. Finally, it applies to every space where every point can be separated from every closed set not containing it by a finite set, in particular to every subspace of the Freudenthal compactification of a locally finite, connected graph. While closed subsets of such a space behave nicely in that they are compact and locally connected (and therefore locally arcwise connected), the general subspaces do not: They may be connected without being arcwise connected. Nevertheless, they satisfy Menger's Theorem.
On the maximum number of cycles in a planar graph
Let G be a graph on p vertices with q edges and let r = q - p + 1. We show that G has at most 15/162(r) cycles. We also show that if G is planar, then G has at most 2(r-1) + o(2(r-1)) cycles. The planar result is best possible in the sense that any prism, that is, the Cartesian product of a cycle and a path with one edge, has more than 2(r-1) cycles.
Exponentially many 5-list-colorings of planar graphs

We prove that every planar graph with $n$ vertices has at least $2n/9$ distinct list-colorings provided every vertex has at least five available colors.

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 571-583
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 97
Issue number: 4
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
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Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.208 SNIP 1.627
Hajos' conjecture for line graphs

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 156-157
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 97
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
Many 3-colorings of triangle-free planar graphs

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 334-349
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 97
ISSN (Print): 0095-8956
Ratings:
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Original language: English
DOIs: 10.1016/j.jctb.2006.06.005
Source: orbit
Source-ID: 197550
Publication: Research - peer-review → Journal article – Annual report year: 2007
On the chromatic number of pentagon-free graphs of large minimum degree

We prove that, for each fixed real number $c > 0$, the pentagon-free graphs of minimum degree at least $cn$ (where $n$ is the number of vertices) have bounded chromatic number. This problem was raised by Erdős and Simonovits in 1973. A similar result holds for any other fixed odd cycle, except the triangle for which there is no such result for $c < 1/3$.

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 241-243
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Combinatorica
Volume: 27
Issue number: 2
ISSN (Print): 0209-9683
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 0.91 SJR 1.204 SNIP 1.603
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.181 SNIP 2.011 CiteScore 1.06
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.265 SNIP 1.49 CiteScore 0.86
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.132 SNIP 1.36 CiteScore 0.86
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.317 SNIP 1.345 CiteScore 0.94
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.803 SNIP 1.335 CiteScore 0.95
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.233 SNIP 1.645
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.727 SNIP 1.577
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.288 SNIP 1.682
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.435 SNIP 1.415
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.295 SNIP 1.376
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.891 SNIP 1.544
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.784 SNIP 1.058
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.028 SNIP 1.187
On the complexity of some colorful problems parametrized by treewidth

General information
State: Published
Organisations: Department of Mathematics, Discrete mathematics
Authors: Fellows, M. (Ekstern), Fomin, F. (Ekstern), Lokshanov, D. (Ekstern), Rosamund, F. (Ekstern), Saurabh, S. (Ekstern), Szeider, S. (Ekstern), Thomassen, C. (Intern)
Pages: 366-377
Publication date: 2007

Claw-decompositions and Tutte-orientations
We conjecture that, for each tree T there exists a natural number k(T) such that the following holds: If G is a k(T)-edge-connected graph such that \(|E(T)| \text{ divides } |E(G)|\), then the edges of G can be divided into parts, each of which is isomorphic to T. We prove that for T=K_1,K_3 (the claw), this holds if and only if there exists a (smallest) natural number k(t) such that every k(t)-edge-connected graph has an orientation for which the indegree of each vertex equals its outdegree modulo 3. Tutte's 3-flow conjecture says that k(t)=4. We prove the weaker statement that every 4\lfloor \log n \rfloor-edge-connected graph with n vertices has an edge-decomposition into claws provided its number of edges is divisible by 3. We also prove that every triangulation of a surface has an edge-decomposition into claws. (C) 2006 Wiley Periodicals, Inc.
Edge-disjoint Hamiltonian cycles in hypertournaments

We introduce a method for reducing k-tournament problems, for $k \geq 3$, to ordinary tournaments, that is, 2-tournaments. It is applied to show that a k-tournament on $n \geq k + 1 + 24d$ vertices (when $k \geq 4$) or on $n \geq 30d + 2$ vertices (when $k = 3$) has d edge-disjoint Hamiltonian cycles if and only if it is d-edge-connected. Ironically, this is proved by ordinary tournament arguments although it only holds for $k \geq 3$. We also characterize the pancyclic k-tournaments, a problem posed by Gutin and Yeo. (Our characterization is slightly incomplete in that we prove it only for $n$ large compared to $k$.)

(c) 2005 Wiley Periodicals, Inc.

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 49-52
Publication date: Jan 2006
Main Research Area: Technical/natural sciences

Publication information
A Cantor-Bernstein theorem for paths in graphs

General information
State: Published
Organisations: Department of Mathematics, Universität Hamburg
Authors: Diestel, R. (Ekstern), Thomassen, C. (Intern)
Density conditions for triangles in multipartite graphs

We consider the problem of finding a large or dense triangle-free subgraph in a given graph G. In response to a question of P. Erdos, we prove that, if the minimum degree of G is at least $9 |V(G)|/10$, the largest triangle-free subgraphs are precisely the largest bipartite subgraphs in G. We investigate in particular the case where G is a complete multipartite graph. We prove that a finite tripartite graph with all edge densities greater than the golden ratio has a triangle and that this bound is best possible. Also we show that an infinite-partite graph with finite parts has a triangle, provided that the edge density between any two parts is greater than 1/2.
On the max-cut problem for a planar, cubic, triangle-free graph, and the Chinese Postman Problem for a planar triangulation

Rectangular and visibility representations of infinite planar graphs

The number of k-colorings of a graph on a fixed surface
We prove that, for every fixed surface S, there exists a largest positive constant c such that every 5-colorable graph with n vertices on S has at least c \cdot 2^n distinct 5-colorings. This is best possible in the sense that, for each sufficiently large natural number n, there is a graph with n vertices on S that has precisely c \cdot 2^n distinct 5-colorings. For the sphere the constant c is 15/2, and for each other surface, it is a finite problem to determine c. There is an analogous result for k-colorings for each natural number k > 5. (c) 2006 Elsevier B.V. All rights reserved.
2-list-coloring planar graphs without monochromatic triangles

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern)
Number of pages: 10
Publication date: 2005

Publication information
Publisher: MAT, DTU
Edition: 2005-05
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 180625
Publication: Research › Report – Annual report year: 2005

Classification of locally 2-connected compact metric spaces
The aim of this paper is to prove that, for compact metric spaces which do not contain infinite complete graphs, the (strong) property of being "locally 2-dimensional" is guaranteed just by a (weak) local connectivity condition. Specifically, we prove that a locally 2-connected, compact metric space M either contains an infinite complete graph or is surface like in the following sense: There exists a unique surface S such that S and M contain the same finite graphs. Moreover, M is embeddable in S, that is, M is homeomorphic to a subset of S.

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 85-103
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication Information
Journal: Combinatorica
Volume: 25
Issue number: 1
ISSN (Print): 0209-9683
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 0.91 SJR 1.204 SNIP 1.603
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.181 SNIP 2.011 CiteScore 1.06
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.265 SNIP 1.49 CiteScore 0.86
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.132 SNIP 1.36 CiteScore 0.86
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.317 SNIP 1.345 CiteScore 0.94
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.803 SNIP 1.335 CiteScore 0.95
**Claw-decompositions and Tutte-orientations**

General information

State: Published
Organisations: Department of Mathematics, University of Szeged
Authors: Thomassen, C. (Intern), Barat, J. (Ekstern)
Number of pages: 12
Publication date: 2005

Publication information

Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 138372
Publication: Research - peer-review › Journal article – Annual report year: 2005

**Edge-disjoint Hamiltonian cycles in hypertournaments**

General information

State: Published
Organisations: Department of Mathematics, University of Novi Sad
Authors: Thomassen, C. (Intern), Petrovic, V. (Ekstern)
Publication date: 2005

Publication information

Publisher: MAT, DTU
Edition: 2005-06
Original language: English
Some remarks on Hajos' conjecture

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 95-105
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 93
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.208 SNIP 1.627
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.613 SNIP 2.034
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.665 SNIP 2.512
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.518 SNIP 1.975
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.163 SNIP 1.974
Scopus rating (2005): SJR 1.431 SNIP 1.48
Web of Science (2005): Indexed yes
Chromatic numbers of triangle-free graphs and their complements

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 95-95
Publication date: 2004

Host publication information
Title of host publication: Oberwolfach Reports
Volume: 1
Place of publication: Zurich
Publisher: EMS Publishing House
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 154503
Publication: Research › Conference abstract in proceedings – Annual report year: 2004

Exponentially many 5-list-colorings of planar graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Publication date: 2004

Publication information
Publisher: MAT, DTU
Edition: 2004-14
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 116712
Publication: Research › Report – Annual report year: 2004

Graphs with not all possible path-kernels
The Path Partition Conjecture states that the vertices of a graph G with longest path of length c may be partitioned into two parts X and Y such that the longest path in the subgraph of G induced by X has length at most a and the longest path in the subgraph of G induced by Y has length at most b, where a + b = c. Moreover, for each pair a, b such that a + b = c there is a partition with this property. A stronger conjecture by Broere, Hajnal and Mihok, raised as a problem by Mihok in 1985, states the following: For every graph G and each integer k, c greater than or equal to k greater than or equal to 2 there is a partition of V(G) into two parts (K, (K) over bar) such that the subgraph G[K] of G induced by K has no path on more than k - 1 vertices and each vertex in (K) over bar is adjacent to an endvertex of a path on k - 1 vertices in G[K]. In this paper we provide a counterexample to this conjecture. (C) 2004 Elsevier B.V. All rights reserved.
Many 3-colorings of triangle-free graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Publication date: 2004

Publication information
Publisher: MAT, DTU
Edition: 2004-11
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 116710
Publication: Research › Report – Annual report year: 2004

Quadrangulations and 4-critical graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 147-149
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 91
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
The locally connected compact metric spaces embeddable in the plane

We prove that a 2-connected, locally connected, compact topological space \( M \) is homeomorphic to a subset of the 2-sphere if and only if \( M \) is metrizable and contains none of the Kuratowski graphs \( K_5 \) and \( K_{3,3} \).

**General information**

State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 699-718
Publication date: 2004
Main Research Area: Technical/natural sciences

**Publication Information**

Journal: Combinatorica
Volume: 24
Issue number: 4
ISSN (Print): 0209-9683
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 0.91 SJR 1.204 SNIP 1.603
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
The number of $k$-colorings of a graph on a fixed surface

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Publication date: 2004

Publication information
Publisher: MAT, DTU
Edition: 2004-06
Original language: English
Tutte's spring theorem
We present a short proof of the theorem of Tutte that every planar 3-connected graph has a drawing in the plane such that every vertex which is not on the outer cycle is the barycenter of its neighbors. Moreover, this holds for any prescribed representation of the outer cycle. (C) 2004 Wiley Periodicals, Inc. J Graph Theory 45: 275-280, 2004.
A short list color proof of Grötzsch’s theorem
We give a short proof of the result that every planar graph of girth 5 is 3-choosable and hence also of Grotzsch’s theorem saying that every planar triangle-free graph is 3-colorable.

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 189-192
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory, Ser.B
Volume: 88
Issue number: 1
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.208 SNIP 1.627
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.613 SNIP 2.034
Graphs with no path-kernels

General information
State: Published
Organisations: Department of Mathematics
Authors: Aldred, R. E. L. (Ekstern), Thomassen, C. (Intern)
Publication date: 2003

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 116703
Publication: Research - peer-review › Journal article – Annual report year: 2003

On the chromatic number of pentagon-free graphs of large minimum degree

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Publication date: 2003

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 28280
Publication: Research › Report – Annual report year: 2003

Quadrangulations and 4-color-critical graphs

General information
State: Published
Some remarks on Hajós' conjecture

The chromatic number of a graph of girth 5 on a fixed surface
3-connected planar spaces uniquely embed in the sphere

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics, University of Waterloo
Authors: Thomassen, C. (Intern), Richter, B. (Ekstern)
Pages: 4585-4595
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: American Mathematical Society. Transactions
Volume: 354
Issue number: 11
ISSN (Print): 0002-9947
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): SJR 2.233 SNIP 1.871 CiteScore 1.34
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
An intersection graph of straight lines

G. Ehrlich, S. Even, and R.E. Tarjan conjectured that the graph obtained from a complete 3 partite graph $K_{4,4,4}$ by deleting the edges of four disjoint triangles is not the intersection graph of straight line segments in the plane. We show that it is.
An Intersection Graph of Straight Lines

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)

BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.72 SJR 0.925 SNIP 1.005
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.933 SNIP 1.104 CiteScore 0.64
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.03 SNIP 1.211 CiteScore 0.68
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.005 SNIP 1.243 CiteScore 0.74
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.965 SNIP 1.193 CiteScore 0.7
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.875 SNIP 0.986 CiteScore 0.66
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.875 SNIP 1.032
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.925 SNIP 1.301
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.942 SNIP 1.36
Scopus rating (2007): SJR 1.035 SNIP 1.194
Scopus rating (2006): SJR 0.912 SNIP 1.072
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.854 SNIP 1.048
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.817 SNIP 0.968
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.789 SNIP 0.848
Scopus rating (2002): SJR 0.834 SNIP 1.232
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.928 SNIP 0.941
Scopus rating (2000): SJR 0.635 SNIP 0.852
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.881 SNIP 0.919
Original language: English
intersection graphs, straight lines
DOIs:
10.1016/S0012-365X(02)00591-5
Source: orbit
Source-ID: 22694
Publication: Research - peer-review › Journal article – Annual report year: 2003
Long cycles in graphs on a fixed surface

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern), Böhme, T. (Ekstern), Mohar, B. (Ekstern)
Pages: 338-347
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 85
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.208 SNIP 1.627
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.613 SNIP 2.034
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.665 SNIP 2.512
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.518 SNIP 1.975
Web of Science (2007): Indexed yes
On the chromatic number of triangle-free graphs of large minimum degree

We prove that, for each fixed real number c > 1/3, the triangle-free graphs of minimum degree at least cn (where n is the number of vertices) have bounded chromatic number. This problem was raised by Erdos and Simonovits in 1973 who pointed out that there is no such result for c <1/3.
Decomposing a planar graph into an independent set and a 3-degenerate graph

We prove the conjecture made by O. V. Borodin in 1976 that the vertex set of every planar graph can be decomposed into an independent set and a set inducing a 3-degenerate graph. (C) 2001 Academic Press.
3-connected Planar Graphs Uniquely Embed in the Sphere

General information
State: Published
Organisations: Discrete mathematics, Department of Mathematics
Authors: Thomassen, C. (Intern), Richter, B. (Ekstern)
Publication date: 2001

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 154345
Publication: Research - peer-review › Report – Annual report year: 2001

Applications of Tutte Cycles

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Publication date: 2001

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 154339
Publication: Research - peer-review › Report – Annual report year: 2001

Challenges for the 21st Century, International Conference on Fundamental Sciences: Mathematics and Theoretical: Chromatic graph theory

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Publication date: 2001

Publication information
Publisher: World ScientificPubl. Co., Singapore
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 46319
Publication: Research - peer-review › Book – Annual report year: 2001

Classification of Locally 2-connected Compact Metric Spaces

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Publication date: 2001

Publication information
Original language: English
Main Research Area: Technical/natural sciences
The Erdos-Posa property for odd cycles in graphs of large connectivity

A graph $G$ is $k$-linked if $G$ has at least $2k$ vertices, and, for any vertices $x(1), x(2), \ldots, x(k), y(1), y(2), \ldots, y(k)$, $G$ contains $k$ pairwise disjoint paths $P_1, P_2, \ldots, P_k$ such that $P_i$ joins $x(i), y(i)$ for $i = 1, 2, \ldots, k$. We say that $G$ is $k$-parity-linked if $G$ is $k$-linked and, in addition, the paths $P_1, P_2, \ldots, P_k$ can be chosen such that the parities of their lengths are prescribed.

We prove the existence of a function $g(k)$ such that every $g(k)$-connected graph is $k$-parity-linked if the deletion of any set of less than $4k - 3$ vertices leaves a nonbipartite graph. As a consequence, we obtain a result of Erdos-Posa type for odd cycles in graphs of large connectivity. Also, every $2(3162)$-connected graph contains a totally odd $K_4$-subdivision, that is, a subdivision of $K_4$ in which each edge of $K_4$ corresponds to an odd path, if and only if the deletion of any vertex leaves a nonbipartite graph.

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 321-333
Publication date: 2001
Main Research Area: Technical/natural sciences

Publication information
Journal: Combinatorica
Volume: 21
Issue number: 2
ISSN (Print): 0209-9683
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 0.91 SJR 1.204 SNIP 1.603
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.181 SNIP 2.011 CiteScore 1.06
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.265 SNIP 1.49 CiteScore 0.86
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.132 SNIP 1.36 CiteScore 0.86
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.317 SNIP 1.345 CiteScore 0.94
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.803 SNIP 1.335 CiteScore 0.95
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.233 SNIP 1.645
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.727 SNIP 1.577
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.288 SNIP 1.682
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.435 SNIP 1.415
The Locally Connected Compact Metric Spaces Embeddable in the Plane

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Publication date: 2001

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 43210
Publication: Research - peer-review › Journal article – Annual report year: 2001

Totally odd K-4-subdivisions in 4-chromatic graphs
We prove the conjecture made by Bjarne Toft in 1975 that every 4-chromatic graph contains a subdivision of K-4 in which each edge of K-4 corresponds to a path of odd length. As an auxiliary result we characterize completely the subspace of the cycle space generated by all cycles through two fixed edges. Toft's conjecture was proved independently in 1995 by Wenan Zang.

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 217-443
Publication date: 2001
Main Research Area: Technical/natural sciences

Publication information
Journal: Combinatorica
Volume: 21
Issue number: 3
ISSN (Print): 0209-9683
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Chromatic roots and hamiltonian paths

We present a new connection between colorings and hamiltonian paths: If the chromatic polynomial of a graph has a noninteger root less than or equal to

\[ t(n) = \frac{2}{3} + \frac{1}{3} \sqrt[3]{26 + 6 \sqrt{33}} + \frac{1}{3} \sqrt[3]{26 - 6 \sqrt{33}} = 1.29559 \ldots \]

then the graph has no hamiltonian path. This result is best possible in the sense that it becomes false if \( t(0) \) is replaced by any larger number. (C) 2000 Academic Press.
A short list color proof of Grotzsch's theorem

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Number of pages: 3
Publication date: 2000

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 176994
Publication: Research - peer-review › Journal article – Annual report year: 2000

Coloring triangle-free graphs with fixed size
Combining recent results on colorings and Ramsey theory, we show that if \( G \) is a triangle-free graph with \( e \) edges then the chromatic number of \( G \) is at most \( \lceil \frac{1}{3} \log e \rceil (2/3) \) for some constant \( c \). In a previous paper, we found an upper bound on the chromatic number of a triangle-free graph of genus \( g \). Using the new result, we slightly improve this bound to \( c g \lceil \frac{1}{3} \log g \rceil (2/3) \). Both bounds are best possible, up to a constant multiple. (C) 2000 Elsevier Science B.V. All rights reserved.

General information
State: Published
Organisations: Department of Mathematics, University of Alaska Fairbanks
Authors: Thomassen, C. (Intern), Gimbel, J. (Ekstern)
Pages: 275-277
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: Discrete Mathematics
Volume: 219
Issue number: 1-3
ISSN (Print): 0012-365X
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.72 SJR 0.925 SNIP 1.005
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.933 SNIP 1.104 CiteScore 0.64
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.03 SNIP 1.211 CiteScore 0.68
Decomposing a planar graph into an independent set and a 3-degenerate graph

The color space of a graph

If k is a prime power, and G is a graph with n vertices, then a k-coloring of G may be considered as a vector in GF(k)(n).

We prove that the subspace of GF(3)(n) spanned by all 3-colorings of a planar triangle-free graph with n vertices has dimension n. In particular, any such graph has at least n - 1 nonequivalent 3-colorings, and the addition of any edge or any
vertex of degree 3 results in a 3-colorable graph. (C) 2000 John Wiley & Sons, Inc.
The rendezvous number of a symmetric matrix and a compact metric space

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 163-166
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: American Mathematical Monthly
Volume: 107
Issue number: 2
ISSN (Print): 0002-9890
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.399 SNIP 0.64 CiteScore 0.26
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.413 SNIP 0.928 CiteScore 0.32
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.408 SNIP 1.097 CiteScore 0.32
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.858 SNIP 1.337 CiteScore 0.54
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.582 SNIP 0.83 CiteScore 0.39
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.628 SNIP 0.988 CiteScore 0.43
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.6 SNIP 0.871
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.492 SNIP 0.95
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.71 SNIP 1.113
Scopus rating (2007): SJR 0.478 SNIP 1.101
Scopus rating (2006): SJR 0.381 SNIP 0.91
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.354 SNIP 0.685
Scopus rating (2004): SJR 0.342 SNIP 0.733
Scopus rating (2003): SJR 0.416 SNIP 0.788
Scopus rating (2002): SJR 0.4 SNIP 0.742
Scopus rating (2001): SJR 0.376 SNIP 0.735
Scopus rating (2000): SJR 0.332 SNIP 1.057
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.309 SNIP 0.964
Original language: English
DOIs:
Chromatic roots and hamiltonian paths

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Number of pages: 6
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174349
Publication: Research - peer-review › Report – Annual report year: 1999

Highly connected sets and the excluded grid theorem

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 61-73
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 75
Issue number: 1
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
On the Nelson unit distance coloring problem

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 850-853
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: The American Mathematical Monthly
Volume: 106
Issue number: 9
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.399 SNIP 0.64 CiteScore 0.26
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.413 SNIP 0.928 CiteScore 0.32
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.408 SNIP 1.097 CiteScore 0.32
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.858 SNIP 1.337 CiteScore 0.54
Parity, cycle space, and K4-subdivisions in graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Number of pages: 15
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174350
Publication: Research - peer-review › Report – Annual report year: 1999

Parity, cycle space, and K4-subdivisions in graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 223-237
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: London Mathematical Society Lecture Notes
Volume: 267
Original language: English
The color space of a graph

General information
State: Published
Organisations: Department of Mathematics, Universität Hamburg
Authors: Thomassen, C. (Intern), Jensen, T. R. (Ekstern)
Number of pages: 13
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 172305
Publication: Research - peer-review › Journal article – Annual report year: 1999

The Erdos-Posa property for odd cycles in graphs of large connectivity

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Number of pages: 11
Publication date: 1999

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 174356
Publication: Research - peer-review › Report – Annual report year: 1999

Two-coloring the edges of a cubic graph such that each monochromatic component is a path of length at most 5

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 100-109
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 75
Issue number: 1
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
Finite Metric Spaces of Strictly Negative Type

We prove that, if a finite metric space is of strictly negative type, then its transfinite diameter is uniquely realized by the infinite extender (load vector). Finite metric spaces that have this property include all spaces on two, three, or four points, all trees, and all finite subspaces of Euclidean spaces. We prove that, if the distance matrix is both hypermetric and regular, then it is of strictly negative type. We show that the strictly negative type finite subspaces of spheres are precisely those which do not contain two pairs of antipodal points. In connection with an open problem raised by Kelly, we conjecture that all finite subspaces of hyperbolic spaces are hypermetric and regular, and hence of strictly negative type.

(C) 1998 Elsevier Science Inc.
Independent dominating sets and a second Hamiltonian cycle in regular graphs
On the Hadwiger-Nelson unit distance coloring problem

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Number of pages: 6
Publication date: 1998

The rendezvous number of a symmetric matrix and a compact connected metric space

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Number of pages: 5
Publication date: 1998

Totally odd K4-subdivisions in 4-chromatic graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Number of pages: 24
Publication date: 1998

A simpler proof of the excluded minor theorem for higher surfaces

General information
State: Published
Organisations: Department of Mathematics
Chords of longest cycles in cubic graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 211-214
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 71
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.208 SNIP 1.627
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.613 SNIP 2.034
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.665 SNIP 2.512
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.518 SNIP 1.975
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.163 SNIP 1.974
Scopus rating (2005): SJR 1.431 SNIP 1.48
Color-critical graphs on a fixed surface

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 67-100
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Combinatorial Theory. Series B
Volume: 70
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Coloring graphs with fixed genus and girth

General information
State: Published
Organisations: Department of Mathematics, University of Alaska Fairbanks
Authors: Thomassen, C. (Intern), Gimbel, J. (Ekstern)
Pages: 4555-4564
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Transactions of the American Mathematical Society
Volume: 349
Original language: English
Source: orbit
Source-ID: 166448
Publication: Research - peer-review › Journal article – Annual report year: 1997

Dirac's conjecture on K5-subdivisions

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 607-608
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: Discrete Mathematics
Volume: 165
On the complexity of finding a minimum cycle cover of a graph

General information
State: Published
On the number of cycles in 3-connected cubic graphs

General information
State: Published
Organisations: Department of Mathematics, University of Otago
Authors: Thomassen, C. (Intern), Aldred, R. (Ekstern)
Pages: 79-84
Relations between crossing numbers of complete graphs and complete bipartite graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern), Richter, B. (Ekstern)
Pages: 131-137
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication information
Journal: American Mathematical Monthly
Volume: 104
Issue number: 2
ISSN (Print): 0002-9890
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.399 SNIP 0.64 CiteScore 0.26
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.413 SNIP 0.928 CiteScore 0.32
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.408 SNIP 1.097 CiteScore 0.32
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.858 SNIP 1.337 CiteScore 0.54
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.582 SNIP 0.83 CiteScore 0.39
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.628 SNIP 0.988 CiteScore 0.43
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.6 SNIP 0.871
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.492 SNIP 0.95
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.71 SNIP 1.113
Scopus rating (2007): SJR 0.478 SNIP 1.101
Scopus rating (2006): SJR 0.381 SNIP 0.91
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.354 SNIP 0.685
Scopus rating (2004): SJR 0.342 SNIP 0.733
Scopus rating (2003): SJR 0.416 SNIP 0.788
Scopus rating (2002): SJR 0.4 SNIP 0.742
Scopus rating (2001): SJR 0.376 SNIP 0.735
Scopus rating (2000): SJR 0.332 SNIP 1.057
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.309 SNIP 0.964
The genus problem for cubic graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 52-58
Publication date: 1997
Main Research Area: Technical/natural sciences

Publication Information
Journal: Journal of Combinatorial Theory. Series B
Volume: 69
ISSN (Print): 0095-8956
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 1.13 SJR 1.965 SNIP 1.959
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.235 SNIP 2.057 CiteScore 1.29
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.211 SNIP 2.018 CiteScore 1.1
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.124 SNIP 1.956 CiteScore 1.19
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.31 SNIP 2.153 CiteScore 1.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 2.313 SNIP 1.751 CiteScore 1.11
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 2.208 SNIP 1.627
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 2.613 SNIP 2.034
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 2.665 SNIP 2.512
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 2.518 SNIP 1.975
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 2.163 SNIP 1.974
K5-subdivisions in Graphs

General information
State: Published
Organisations: Department of Mathematics
Authors: Thomassen, C. (Intern)
Pages: 179-189
Publication date: 1996
Main Research Area: Technical/natural sciences

Publication information
Journal: Combinatorics, Probability & Computing
Volume: 5
ISSN (Print): 0963-5483
Ratings:
BFI (2018): BFI-level 2
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): SJR 1.358 SNIP 1.256 CiteScore 0.92
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 0.996 SNIP 1.025 CiteScore 0.91
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.487 SNIP 1.202 CiteScore 0.89
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.275 SNIP 1.121 CiteScore 0.85
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.381 SNIP 1.387 CiteScore 0.87
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.641 SNIP 1.223 CiteScore 0.9
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.816 SNIP 1.251
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.689 SNIP 1.373
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.597 SNIP 1.532
Scopus rating (2007): SJR 1.686 SNIP 1.47
Scopus rating (2006): SJR 1.218 SNIP 1.487
Scopus rating (2005): SJR 0.742 SNIP 1.198
Scopus rating (2004): SJR 0.784 SNIP 1.309
Scopus rating (2003): SJR 0.724 SNIP 0.849
Scopus rating (2002): SJR 0.723 SNIP 1.111
Scopus rating (2001): SJR 0.919 SNIP 0.811
Scopus rating (2000): SJR 0.598 SNIP 0.807
Scopus rating (1999): SJR 1.016 SNIP 0.894
Original language: English
Source: orbit
Source-ID: 165866
Graph Coloring and Decomposition
Department of Applied Mathematics and Computer Science
Period: 01/08/2016 → 31/07/2019
Number of participants: 3
Phd Student:
Lyngsie, Kasper Szabo (Intern)
Supervisor:
Gertz, Inge Li (Intern)
Main Supervisor:
Thomassen, Carsten (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

Matching and Compression of Strings with Automata and Word Packing
Department of Applied Mathematics and Computer Science
Period: 01/03/2014 → 14/06/2017
Number of participants: 7
Phd Student:
Skjoldjensen, Frederik Rye (Intern)
Supervisor:
Gertz, Inge Li (Intern)
Thomassen, Carsten (Intern)
Main Supervisor:
Bille, Philip (Intern)
Examiner:
Witt, Carsten (Intern)
Landau, Gad M. (Ekstern)
Pagh, Rasmus (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering

Relations
Publications:
Matching and Compression of Strings with Automata and Word Packing
Project: PhD

Chromatic Graph Theory
Department of Applied Mathematics and Computer Science
Period: 01/10/2013 → 16/08/2017
Number of participants: 5
Phd Student:
Perrett, Thomas (Intern)
Main Supervisor:
Thomassen, Carsten (Intern)
Examiner:
Fischer, Paul (Intern)
Jackson, William Bill (Ekstern)
Kundgen, Andre (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Anden EU-finansiering

Relations
Publications:
Roots of the Chromatic Polynomial
Project: PhD

Decomposition of Graphs
Department of Applied Mathematics and Computer Science
Number of participants: 5
Phd Student:
Merker, Martin (Intern)
Main Supervisor:
Thomassen, Carsten (Intern)
Examiner:
Gartz, Inge Li (Intern)
Bang-Jensen, Jørgen (Ekstern)
Barat, Janos (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Anden EU-finansiering

Relations
Publications:
Graph Decompositions
Project: PhD

Aspects of the Tutte Polynomial of a Graph
Department of Applied Mathematics and Computer Science
Period: 01/10/2012 → 30/09/2015
Number of participants: 5
Phd Student:
Ok, Seongmin (Intern)
Main Supervisor:
Thomassen, Carsten (Intern)
Examiner:
Fischer, Paul (Intern)
Bang-Jensen, Jørgen (Ekstern)
Jackson, William Bill (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.
Project: PhD

Central digraphs
Department of Mathematics
California State University
Period: 01/01/2010 → 01/01/2011
Number of participants: 2
Project participant:
Leander, Gregor (Intern)
Thomassen, Carsten (Intern)

Spanning trees in cubic graphs
The number of spanning trees, acyclic orientations, and totally cyclic orientations are examples of evaluations of the Tutte polynomial which plays a central role in statistical mechanics. In the present project we investigate a conjecture of Merino and Welsh on the interplay between these invariants.
Graphs on higher surfaces
This project is a collaboration between Dr. Ken-ichi Kawarabayashi, National Institute of Informatics, National Center of Science, Japan, and Professor Carsten Thomassen, DTU, concerning extendability of results on planar graphs to higher surfaces. The project is supported (in the form of travel expenses) by FNU (Rammebevilling i Diskret Matematik) and National Center of Science, Tokyo, Japan.

Chromatic numbers and graph decomposition

Diskret matematik
The structure of triangle-free graphs
Carsten Thomassen proved in 1999 the conjecture made by Erdoes and Simonovits in 1973 that for every c greater than 1/3, the triangle-free graphs of minimum degree at least cn have bounded chromatic number. There is no such result if c is less than 1/3. In collaboration with Adrian Bondy and Stephan Thomasse at Universite Claude Bernard, Lyon, Carsten Thomassen studies density conditions implying triangles in graphs.
**Combinatorial Differential Geometry**

The purpose of this project is to use finite distance geometry in conjunction with theoretical work on Alexandrov spaces to find good candidates for metric invariants that can efficiently be used to recognize and characterize Riemannian manifolds and metric spaces in general. Computer experiments play a natural and very crucial role for the advancement of this project.

Department of Mathematics  
Period: 01/01/1996 → …  
Number of participants: 3  
Project participant:  
Hjorth, Poul G. (Intern)  
Thomassen, Carsten (Intern)  
Project Manager, organisational:  
Markvorsen, Steen (Intern)  

**Cycles in Graphs**

In 1996 we have developed a general method for finding a second hamiltonian cycle in a hamiltonian graph. The method has been used to attack the conjecture made by Thomassen in 1976 that every longest cycle in a 3-connected graph has a chord. The conjecture has now been verified for cubic graphs. Furthermore, it has been proved in a joint work with R.E.L. Aldred, New Zealand, that the number of cycles in a cubic, 3-connected graph grows superpolynomial, a conjecture made in 1986 by Barefoot, Clark and Entringer. In 1997 we have combined the sufficient condition for a second hamiltonian cycle in terms of independent dominating sets with Lovasz’ Local Lemma to prove that every hamiltonian $r$-regular graph has a second hamiltonian cycle if $r$ is at least 300. This is a step towards the 1975 conjecture of John Sheehan that every such graph has a second hamiltonian graph provided $r$ is at least 4. In 1997 we also proved the conjecture made by Bermond, Fouquet, Habib and Peroche in 1984 that every cubic graph has a 2-edge-coloring such that each monochromatic component is a path of length at most 5. The number 5 cannot be replaced by 4.

Department of Mathematics  
Period: 01/01/1996 → 31/12/1998  
Number of participants: 2  
Project participant:  
Aldred, R.E.L. (Ekstern)  
Project Manager, organisational:  
Thomassen, Carsten (Intern)  

**Graphs on Surfaces**

In 1996 Thomassen proved the conjecture made by R.B. Richter in 1991, that the graph genus problem for cubic graphs is NP-complete. Furthermore, we have obtained a relatively short proof of the deep result in the Robertson-Seymour theory that, for any fixed surface, there are only finitely many obstructions for the graph embedding problem in that surface. Since 1997, the work in this project has concentrated on the monograph on graphs on surfaces written in collaboration with Bojan Mohar, University of Ljubljana. This work is planned to be completed in 2000.

Department of Mathematics  
Period: 01/01/1996 → …  
Number of participants: 2  
Project Manager, organisational:  
Thomassen, Carsten (Intern)  
Mohar, B. (Ekstern)  