

Christophe Weibel

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Education and Employment

Research Associate, 2010 - present

Computer Science, Dartmouth College, Hanover NH, United States
Supervisor: Prof. Lisa Fleischer

Postdoctoral Fellow, 2007 - 2010

Department of Mathematics and Statistics, McGill University, Montreal, Canada
Supervisor: Prof. Bruce Shepherd

PhD Thesis, 2002 - August 2007

Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Dissertation: Minkowski sums of polytopes: Combinatorics and Computation
Supervisor: Prof. Thomas M. Liebling and Prof. Komei Fukuda
Jury: Prof. Peter Gritzmann and Prof. Günter M. Ziegler

IT Consultant, 2000 - 2002

ELCA Informatique, Lausanne, Switzerland

Master in Mathematics, April 2000

Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Dissertation: Parallel implementation of a distinct elements simulation of a granular media
Supervisor: Prof. Thomas M. Liebling and Jean-Albert Ferrez
Jury: Didier Müller

Research Interests

- Network flows
- Combinatorial optimization
- Computational geometry

Publications

Journal papers

L. Zhang, S. Lazard, C. Weibel, S. Whitesides. "A Succinct 3D Visibility Skeleton". *Discrete Mathematics, Algorithms and Applications*, vol. 2 (2010), pp. 567-589

K. Fukuda, C. Weibel. "A linear equation for Minkowski sums of polytopes relatively in general position". *European Journal of Combinatorics*, vol. 31 (2010), pp. 565-573

E. Fogel, D. Halperin, C. Weibel. “On the exact maximum complexity of Minkowski sums of convex polyhedra”. *Discrete & Computational Geometry*, vol. 42 (2009), pp. 654-669

K. Fukuda, C. Weibel. “On f-vectors of Minkowski additions of convex polytopes”. *Discrete & Computational Geometry*, vol. 37 (2007), pp. 503-516

C. Osorio, C. Weibel, P. Perez, M. Bierlaire, P. Garnerin. “Patient flow simulation as a tool for estimating policy impact”. In *Swiss Medical Informatics*, vol. 58 (2006), pp. 33-36

Conference proceedings

C. Weibel, L. Zhang. “Minimum Perimeter Convex Hull of Imprecise Points in Convex Regions”. Accepted by the *ACM Symposium on Computational Geometry (SoCG 2011)*, multimedia session

E. Chambers, A. Erickson, S. Fekete, J. Lenchner, J. Sember, V. Srinivasan, U. Stege, S. Stolpner, C. Weibel, S. Whitesides. “Connectivity graphs of uncertainty regions”. Presented at *International Symposium on Algorithms and Computation (ISAAC 2010)*

V. Dujmović, W. Evans, S. Kobourov, G. Liotta, C. Weibel, S. Wismath. “On Graphs Supported by Line Sets”. In *Proc. of the 18th Symposium on Graph Drawing (GD 2010)*. Full version submitted to *Computational Geometry, Theory and Applications*

L. Zhang, S. Lazard, C. Weibel, S. Whitesides. “On the Computation of the 3D Visibility Skeleton”. In *Proceedings of the 16th Annual International Computing and Combinatorics Conference (COCOON 2010)*, pp. 469-478

C. Chekuri, B. Shepherd, C. Weibel. “Flow-Cut Gaps for Integer and Fractional Multiflows”. In *Proceedings of the 21st Annual ACM-SIAM Symposium on Discrete Algorithms (SoDA 2010)*, pp. 1198-1208. Full version submitted to the *Journal of Combinatorial Theory, Series B*

C. Weibel. “Implementation & parallelization of a reverse-search algorithm for Minkowski sums”. In *Proceedings of the 12th Workshop on Algorithm Engineering and Experiments (ALENEX 2010)*, pp. 34-42

L. Zhang, H. Everett, S. Lazard, C. Weibel, S. Whitesides. “On the size of the 3D visibility skeleton: experimental results”. In *Proceedings of the 16th Annual European Symposium on Algorithms (ESA 2008)*, LNCS vol. 5193, pp. 805-816

E. Fogel, D. Halperin, C. Weibel. “On the exact maximum complexity of Minkowski sums of convex polyhedra”. In *Proceedings of the 23rd ACM Symposium on Computational Geometry (SoCG 2007)*, pp. 319-326

K. Fukuda, C. Weibel. “Computing faces up to k dimensions of a Minkowski Sum of Polytopes”. In *Proceedings of the 17th Canadian Conference on Computational Geometry (CCCG 2005)*, pp. 256-259

Manuscripts

C. Weibel. “Maximal f-vectors of Minkowski sums of large numbers of polytopes”. Submitted to *Discrete & Computational Geometry*

A. Chakrabarti, L. Fleischer, C. Weibel. “A complete characterization of cut-sufficient instances of multiflows in series-parallel networks”. In preparation

F. Santos, C. Weibel. “Low-dimensional counter-examples to the Hirsch conjecture”. In preparation

G. Naves, C. Weibel. “Congestion in planar graphs with demands on faces”. Manuscript

K. Fukuda, C. Weibel. “Facet computation for Minkowski sums of polytopes”. Manuscript

Software

MINKSUM

Computational geometry software in C++ based on an algorithm of Komei Fukuda for the computation of Minkowski sums of polytopes

Sequential and parallel implementations

Available at <http://www.cs.dartmouth.edu/~weibel/minksum.php>

Talks

2011

Poster presentation for the IPAM workshop at UCLA, *Efficiency of the Simplex Method: Quo vadis Hirsch conjecture?*, Los Angeles (US)

2010

Dartmouth Computer Science Colloquium, Dartmouth College, Hanover (US)

16th Annual International Computing and Combinatorics Conference (COCOON 2010), Nha Trang (Vietnam)

Invited talk at the CMS Summer Meeting, Fredericton (Canada)

Invited talk at Dartmouth College, Hanover (US)

ACM-SIAM Symposium on Discrete Algorithms (SoDA 10), Austin (US)

SIAM Workshop on Algorithm Engineering & Experiments (ALENEX 10), Austin (US)

2009

Discrete & Mathematical Optimization Seminar, McGill University, Montreal (Canada)

20th International Symposium for Mathematical Programming (ISMP 09), Chicago (US)

Canada-Japan Workshop on Discrete and Computational Geometry, Tokyo (Japan)

Optimization Seminar, McMaster University (Canada)

Invited talk at the Max Planck Institute, Saarbrücken (Germany)

Combinatorial Geometry & Optimization Seminar, EPF Lausanne (Switzerland)

Optimization & Applications Seminar, ETH Zürich (Switzerland)

Invited talk at Victoria University (Canada)

2008

Discrete & Mathematical Optimization Seminar, McGill University, Montreal (Canada)

2007

European Workshop on Combinatorial Geometry, Gratz (Austria)

3e cycle romand de recherche opérationnelle, Zinal (Switzerland)

2006

Joint Operations Research Days, Lausanne (Switzerland)

ADONET Meeting, Lausanne (Switzerland)

3e cycle romand de recherche opérationnelle, Zinal (Switzerland)

2005

UC Berkeley Combinatorics Seminar, Berkeley (US)

Canadian Conference on Computational Geometry, Windsor (Canada)

Educational Workshop on Geometric Inequalities, Firenze (Italy)

Invited Research Workshops

- *January 2009 & 2010*: International INRIA-McGill Workshop on Problems in Computational Geometry, Bellairs Research Institute of McGill University, Barbados, organized by Hazel Everett, Sylvain Lazard and Sue Whitesides
- *November 2008*: Bonn Workshop on Combinatorial Optimization, Research Institute for Discrete Mathematics, University of Bonn, Germany, organized by William Cook, Bernhard Korte, László Lovász and Jens Vygen
- *April 2008*: Workshop on Integer Programming, Bellairs Research Institute of McGill University, Barbados, organized by William Cook, Fritz Eisenbrand and Bruce Shepherd

Research Grants

- SNF Postdoctoral Fellowship
“Minkowski Sums of Polytopes”
Awarded by the Swiss National Fund
44'000 CAD for one year (2007-2008) at McGill University
- SNF Doctoral Fellowship
“Polytopes, Matroids and Polynomial Systems”
Awarded by the Swiss National Fund
150'000 CHF over three years (2004-2007) at EPFL
- Research Fellowship
“SOPHOS : Simulation-Based Optimization of the Performance in Hospital Operating Suites”
Awarded by the Hospitals of the University of Geneva
90'000 CHF over one year and a half (2002-2004) at EPFL

Related experience

Research*Reviewer*

ACM Symposium on the Theory of Computing, Mathematical Programming, ACM Symposium on Computational Geometry, SIAM Journal on Computing, Discrete & Computational Geometry, Computational Geometry: Theory and Applications, Operations Research, Annals of Combinatorics, Statistica Sinica, Computer-Aided Design

Research Assistant, Institute of Mathematics, EPFL, 2002-2003

- Design and implementation of a hospital patient flow simulator
- Statistical analysis of patients surgery and recovery time

Teaching

Assistant Lecturer, Dartmouth College, 2011

- Mathematical Optimization (with Lisa Fleischer, 8 grad students)

Student project supervision, Dartmouth College, 2010-2011

- *Game theory in network flows*, for the *Women in Science Project (WISP)*

Student project supervision, McGill University, 2008

- *Netflix Prize Competition*, supported by an ISM-CRM scholarship

Lecturer, McGill University, 2007-2009

- Linear Algebra (2009, 60 undergrad students)
- Polyhedral combinatorics for discrete optimization (2008, with Bruce Shepherd, 8 grad students)
- Honours Algorithm Design (2007, 12 undergrad students)

Teaching Assistant, Institute of Mathematics, EPFL, 2002-2007

- Game Theory (2005 & 2007, 20 grad students)
- Decision Models (2004 & 2006, 30 grad students)
- Discrete and algorithmic geometry (2005, 25 grad students)
- Operations Research (2002 - 2004, 40 undergrad students)
- Linear Algebra (2003 - 2004, 200 undergrad students)

Student project supervision, Institute of Mathematics, EPFL, 2002-2007

- *Modelisation of the compressive behavior of a fiber lacing* (Master thesis)
- *Sudoku Resolution*
- *Size of production lots*
- *Strategy optimization for Mah-Jong*
- *Simulator for the University of Geneva Hospitals*

Private sector

IT Consultant, ELCA Informatique, Lausanne, 2000-2002

- Specification and implementation of components for a banking application
- Implementation of a databank application for operational events

Duties

Webmaster, ROSO lab, 2004-2007

Webmaster, Association of Mathematicians from EPFL, 2000-2007

Competitions

- ACM Programming Contest
EPFL team, Ulm 1997-1999
- Championnat de Jeux Mathématiques et Logiques
4th place, Paris 1995
- International Mathematics Olympiad
Swiss national team, Hong-Kong 1994

Languages

English, French: fluent

German, Japanese: working knowledge