

VISSARION FISIKOPOULOS

📍 Algorithms Group, Computer Science Department
Université libre de Bruxelles (ULB)
CP 212, Bvd. du Triomphe, 1050 Brussels
Belgium

🏠 <http://homepages.ulb.ac.be/~vfishkop>
✉ vfishkop [at] ulb [dot] ac [dot] be
☎ +32 484289782

SUMMARY

More than 7 years of experience in scientific development and analysis of new algorithms and software.

Strong background in geometric optimization, (high-dimensional) computational geometry, polyhedral combinatorics and computation as well as in algorithm engineering, generic programming, and randomized algorithms.

Research interests in the analysis and computation of large, complex geometric structures and data that arise in scientific and technological areas (CAD, optimization, biology) or in the theory of computation (polynomial systems solving, combinatorial optimization).

EDUCATION

- 2014 **PhD**, Computer Science, University of Athens, Greece
“High-dimensional polytopes defined by oracles: algorithms, computations and applications”
- 2009 **MSc**, Logic, Algorithms and Computation, University of Athens, Greece
- 2007 **Diploma** (5-year-degree), Computer Engineering and Informatics, University of Patras, Greece

ACADEMIC/RESEARCH POSITIONS

- 7/2014 - present : **Postdoc Researcher**, Université libre de Bruxelles (ULB)
- 4/2015 - present: “Frontiers of Extended Formulations”, ERC, EU, PI: Prof. Samuel Fiorini
 - 07/2014 - 4/2015: FNRS research grant, PI: Prof. Stefan Langerman
- 5/2014 - 6/2014 : **Postdoc Researcher**, National Institute for Mathematical Sciences, Daejeon, South Korea
Thematic Program on Applied Algebraic Geometry (PI: Prof. Bernd Sturmfels)
- 9/2009 - 4/2014 : **Research Assistant**, University of Athens, Greece
- 11/2013 - 04/2014: “Advanced Geometric Computing”, Gr & EU, PI: Prof. Ioannis Z.Emiris (PhD funding)
 - 02/2011 - 10/2013: “Computational Geometric Learning”, ICT, EU, PI: Prof. Ioannis Z.Emiris (PhD funding)
 - 4-12/2010: “Semantic Sensor Grids”, ICT, EU, PI: Prof. Manolis Koubarakis
 - 9-11/2009: “ACS: Algorithms for complex shapes”, ICT, EU, PI: Prof. Ioannis Z.Emiris
- 7-8/2009: **Internship**, INRIA, Sophia-Antipolis, France
“Meshing of periodic minimal surfaces”, Geometrica group, PI: Dr. Monique Teillaud
- 2/2007 - 3/2008: **Software developer**, Business Web Solutions, Patras, Greece
“Development of PHP server - Actionscript client platform for web applications”

RESEARCH VISITS

- 9/2015 : | **Visitor Researcher**, Laboratory of Algebraic and Geometric Algorithms (ErGA), University of Athens, Greece, PI: Prof. Ioannis Z.Emiris (3 weeks)
- 11/2014 : | **Visitor Researcher**, Geometrica group, INRIA Sophia-Antipolis, France, PI: Research Director Jean Daniel Boissonnat (3 weeks)
- 7/2012 : | **Visitor PhD student**, Theory of Combinatorial Algorithms Group, ETH Zurich, Switzerland, PI: Prof. Bernd Gärtner (1 month)

TEACHING EXPERIENCE

- 2009 - 2014: | **Teaching Assistant**, Department of Informatics & Telecommunications, University of Athens
- COMPUTATIONAL GEOMETRY (undergrad/grad course) (5 years: 2010-2014)
Resp/ties: Lectures, writing notes & slides, assignments (theory, software) & grading.
 - FOUNDATIONS OF DATABASES (grad course) (2009)
Resp/ties: Assignments and grading
- 2009 - 2011: | **Teacher** in "Prisma secondary private school"; course: "Algorithms"

SELECTED TALKS

INVITED TALKS

1. "Polyhedral computations in computational algebraic geometry and optimization", Lunch seminar, London School of Economics, UK, 2015.
2. "Volume and edge-skeleton computation in high dimensions", Geometrica seminar, INRIA Sophia-Antipolis, France, 2014.
3. "Polytopes defined by oracles: algorithms and combinatorics", Discrete Mathematics seminar, Korea Advanced Institute of Science and Technology (KAIST), S. Korea, 2014.
4. "Polytopes defined by Oracles: Algorithms and Combinatorics", Dept. of Mathematics seminar, University of Padova, Italy, 2014.
5. "Efficient Edge-Skeleton and Volume Computation for Polytopes Defined by Oracles", Discrete Mathematics Optimization Seminar, McGill, Canada, 2013.
6. "Constructing Polytopes via a Vertex Oracle." Mittagssseminar, ETH Zurich, Switzerland, 2012.

CONFERENCES & WORKSHOPS

(c): conference, (w): workshop, (p): poster

1. (c) "Enumerating 2-level polytopes", Applications in Computer Algebra, Kalamata, & European Symposium on Algorithms (ESA), Patras, Greece, 2015.
2. (c) "The Newton polytope of the sparse resultant", 3rd ERC "SDModels" Workshop, Berlin, Germany, 2015.
3. (c) "Efficient random walk methods for approximating polytope volume", Symposium on Computational Geometry (SoCG), Kyoto, Japan, 2014.
4. (c) "Combinatorics of 4-dimensional resultant polytopes", ACM International Symposium on Symbolic and Algebraic Computation (ISSAC), Boston, USA, 2013.
5. (p) "A software framework for computing Newton polytopes of resultants and discriminants", Effective Methods on Algebraic Geometry (MEGA), Frankfurt, Germany, 2013.

6. (w) "Efficient volume and edge-skeleton computation for polytopes given by oracles", European Symposium on Computational Geometry (EuroCG), Braunschweig, Germany, 2013.
7. (w) "Polytime volume and edge-skeleton computation for polytopes given by oracles", Geometric Computing Workshop, Heraklion, Greece, 2013.
8. (c) "Faster Geometric Algorithms via Dynamic Determinant Computation", European Symposium on Algorithms (ESA), Ljubljana, Slovenia, 2012.
9. (c) "An output-sensitive algorithm for computing projections of resultant polytopes", Symposium on Computational Geometry (SoCG), NC, USA, 2012.
10. (w) "Exact and approximate algorithms for resultant polytopes", European Symposium on Computational Geometry (EuroCG), Assisi, Italy, 2012.
11. (w) "Regular triangulations & resultant polytopes", European Symposium on Computational Geometry (EuroCG), Dortmund, Germany, 2010.

SOFTWARE DEVELOPMENT

1. *Software:* ResPol

Description: Open source software to compute a projection of the Newton polytope of the resultant of a given polynomial system, or its orthogonal projection along a given direction. The resultant is fundamental and has applications in geometric modelling, algebraic elimination, optimization.

Developers: Vissarion Fisikopoulos, Luis Peñaranda

Implementation: C++, CGAL

Published: Part submitted to CGAL (Computational Geometry Algorithms Library - <http://www.cgal.org>) under "Lifted_Kernel_d Feature", full code: <http://sourceforge.net/projects/respol>

2. *Software:* HeaDDaChe

Description: Open source software that implements the scheme of hashed dynamic determinant predicates for faster geometric computation, such as convex hull, volume computation and point location.

Developers: Vissarion Fisikopoulos, Luis Peñaranda

Implementation: C++, CGAL

Published: <http://sourceforge.net/projects/hdch>

3. *Software:* VolEsti

Description: Open source software that provides algorithms for volume approximation of polytopes in high dimensions (a few hundred), using geometric sampling methods such as hit-and-run.

Developers: Vissarion Fisikopoulos

Implementation: C++, Boost, CGAL

Published: <http://sourceforge.net/projects/randgeom>

4. *Software:* 2LevelEnum

Description: Open source software to efficiently enumerate 2-level (or compressed) polytopes in low dimensions (less than 10).

Developers: Vissarion Fisikopoulos

Implementation: Perl, polymake - <http://www.polymake.org>

Published: <http://sourceforge.net/projects/randgeom>

PROFESSIONAL ACTIVITIES

SCIENTIFIC REVIEWING SERVICE

- Reviewer for Mathematical Reviews of the American Mathematical Society (MR)
- Reviewer for scientific journals and conferences: *Algorithmica* J, *Theoretical Computer Science* J, ACM Symp. on Comput. Geometry (SoCG), ACM-SIAM Symposium on Discrete Algorithms (SODA), SIAM Algorithm Engineering and Experiments (ALENEX), European Symposium on Algorithms (ESA), Symposium on Experimental

Algorithms (SEA), Algorithms and Data Structures Symposium (WADS), Symposium on Theoretical Aspects of Computer Science (STACS), Conf. on Effective Methods in Algebraic Geometry (MEGA).

EVENT ORGANIZATION

- Final Research Workshop of EU project “Computational Geometry Learning”, Vravrona, Greece, 2013
- 7th Athens Colloquium on Algorithms and Complexity University of Athens, Athens, Greece, 2012
- Fall School “ShApes, Geometry and Algebra (SAGA)”, Kolympari, Greece, October 4-8 2010

SCIENTIFIC AND PROFESSIONAL MEMBERSHIPS

- Technical Chamber of Greece (TEE-TCG), ACM Symbolic and Algebraic Manipulation

GRANTS, FELLOWSHIPS, AWARDS

- Short visit research grant (visit Univ. of Athens), National Fund for Scientific Research (FNRS), Belgium, 2015.
- Conference travel grant ($\times 2$), National Fund for Scientific Research (FNRS), Belgium, 2014-15.
- Visiting Researcher Fellowship, National Institute for Mathematical Sciences, S.Korea, 2014.

TECHNICAL SKILLS

PROGRAMMING: C, C++, Java, Lisp, Assembly
SCRIPT: Python, Perl, linux shell
SCIENTIFIC: Matlab, Maple, HPC, Flex/Bison
WWW/DATABASES: PHP, SQL, Javascript, CSS, XML/XSL
SYSTEMS: Unix/Linux/Minix, MS Windows

LANGUAGE SKILLS

GREEK: native (mother tongue)
ENGLISH: fluent
GERMAN: basic
FRENCH: basic

PERSONAL DATA

Born: 1983, Greece

Gender: Male

Citizenship: Greek

REFERENCES

Upon request

LIST OF PUBLICATIONS

PREPRINTS

1. 2-level polytopes with a prescribed facet.
Joint with S. Fiorini and M. Macchia
2. Practical polytope volume approximation.
Joint with I.Z.Emiris. (Submitted to journal)
3. Combinatorics of 4-dimensional resultant polytopes.
Joint with A.Dickenstein and I.Z.Emiris. (Journal version in preparation)

PEER-REVIEWED JOURNALS

1. Faster geometric algorithms via dynamic determinant computation.
Joint with L.Peñaranda.
Computational Geometry: Theory and Applications, Elsevier, (to appear).
2. Efficient edge skeleton computation for polytopes defined by oracles.
Joint with I.Z.Emiris and B.Gaertner.
Journal of Symbolic Computation, vol. 73, pp. 139-152, Elsevier, 2016.
3. An oracle-based, output sensitive algorithm for projections of resultant polytopes.
Joint with I.Z.Emiris, C.Konaxis and L.Peñaranda.
International Journal of Computational Geometry and Applications (Special issue), vol. 23, pp. 397-423, World Scientific, 2013.

PEER-REVIEWED CONFERENCES

1. Enumeration of 2-level polytopes.
Joint with A. Bohn, Y. Faenza, S. Fiorini, M. Macchia and K. Pashkovich
In Proc. of European Symposium on Algorithms (ESA '15), Patras, Greece.
2. Efficient random walk methods for approximating polytope volume.
Joint with I.Z.Emiris.
In Proc. of 30th ACM Symp. on Comput. Geometry (SoCG '14), Kyoto, Japan.
3. Combinatorics of 4-dimensional resultant polytopes.
Joint with A.Dickenstein and I.Z.Emiris.
In Proc. of the 38th ACM Symp. on Symbolic and Algebraic Computation (ISSAC '13), Boston, MA, USA.
4. A software framework for computing Newton polytopes of resultants and (reduced) discriminants.
Joint with I.Z.Emiris and C.Konaxis.
12th Intern. Conf. on Effective Methods in Algebraic Geometry (MEGA 2013), Frankfurt, Germany (poster)
5. Faster geometric algorithms via dynamic determinant computation.
Joint with L.Peñaranda.
In Proc. of European Symposium on Algorithms (ESA '12), Ljubljana, Slovenia.
6. An output-sensitive algorithm for computing projections of resultant polytopes.
Joint with I.Z.Emiris, C.Konaxis and L.Peñaranda.
In Proc. of 28th ACM Symp. on Comput. Geometry (SoCG '12), NC, USA.
7. In silico tomographic image generation using Monte Carlo and computational geometry.
Joint with K.Eftaxias and G.M.Spyrou.
In Proc. of 10th IEEE Intern. Conf. Inf. Techn. & Applic. in Biomed. (ITAB) 2010.
8. Meshing of Triply-Periodic Smooth Surfaces in CGAL. *Joint with M.Caroli and M.Teillaud.*
7th International Conference on Curves and Surfaces, Avignon, France, 2010 (poster)

CONFERENCES WITH LIMITED REVIEW

1. Efficient random-walk methods for approximating polytope volume. *Joint with I.Z.Emiris. In Proc. of 30th European Workshop on Computational Geometry (EuroCG14), Dead sea, Israel 2014.*
2. Efficient volume and edge-skeleton computation for polytopes given by oracles. *Joint with I.Z.Emiris and B.Gaertner. In Proc. of 29th European Workshop on Computational Geometry (EuroCG13), Braunschweig, Germany, 2013.*
3. Optimizing the computation of sequences of determinantal predicates. *Joint with I.Z.Emiris and L.Peñaranda. In Proc. of 28th European Workshop on Computational Geometry (EuroCG12), Assisi, Perugia, Italy, 2012.*
4. Exact and approximate algorithms for resultant polytopes. *Joint with I.Z.Emiris and C.Konaxis. In Proceedings of 28th European Workshop on Comput. Geometry (EuroCG12), Assisi, Perugia, Italy, 2012.*
5. Regular triangulations and resultant polytopes. *Joint with I.Z.Emiris and C.Konaxis. In Proc. of 26th European Workshop on Comput. Geometry (EuroCG10), Dortmund, Germany, 2010.*

TECHNICAL REPORTS

1. Algorithms for volume approximation of convex bodies. *Joint with I.Z. Emiris. Technical Report CGL-TR-76, November 2013.*
2. Efficient edge skeleton computation for polytopes defined by oracles. *Joint with I.Z. Emiris, B. Gärtner. Technical Report CGL-TR-75, November 2013.*
3. An oracle-based, output-sensitive algorithm for projections of resultant polytopes. *Joint with I.Z.Emiris, C.Konaxis and L.Peñaranda. Technical Report CGL-TR-28, October 2012.*
4. High-dimensional predicates: Algorithms and software. *Joint with I.Z.Emiris and L.Peñaranda. Technical Report CGL-TR-27, October 2012.*
5. Optimizing the computation of sequences of determinantal predicates. *Joint with I.Z.Emiris and L.Peñaranda. Technical Report CGL-TR-14, October 2011.*
6. An output-sensitive algorithm for computing projections of resultant polytopes. *Joint with I.Z.Emiris and C.Konaxis. Technical Report CGL-TR-08, October 2011.*
7. Theoretical results on query processing for RDF/SPARQL with time and space. *Joint with M.Koubarakis, C.Nikolaou. Technical Report TELEIOS-D2.3, 2011.*
8. Enumerating classes of regular triangulations. *Fall School Shapes, Geometry, and Algebra (SAGA) Kolympari, Greece, 2010 (poster).*
9. An implementation of range trees with fractional cascading in C++. *Univ. of Athens. arXiv:1103.4521, 2009. Computational Geometry course 2008 (advisor: Ioannis Z.Emiris)*
10. Representation of complete and incomplete temporal constraint information in relational database systems. *Univ. of Athens. Theory of Databases course 2008 (advisor: Manolis Koubarakis)*

THESES

1. High-dimensional polytopes defined by oracles: algorithms, computations and applications. *PhD thesis at University of Athens, 2014. (advisor: Prof. Ioannis Z.Emiris)*
2. Triangulations of point sets, high dimensional polytopes and applications. *Master's thesis at University of Athens, 2010. (advisor: Prof. Ioannis Z.Emiris)*
3. Study of the effect of cost policies in the convergence of selfish strategies in pure Nash equilibria in congestion games. *Diploma thesis at University of Patras, 2007. (advisor: Prof. Paul Spirakis)*