

# Ioannis Koutis

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## Education

PhD 2007 : Carnegie Mellon University, Pittsburgh.  
Thesis: Combinatorial and algebraic tools for optimal multilevel algorithms; Advisor: Gary L. Miller.

BSc/Diploma 1998: Computer Engineering and Informatics Department, University of Patras.  
Thesis: Parallel algorithms for the computation of pseudospectra; Advisor: Efstratios Gallopoulos.  
*Engineering School Valedictorian.*

## Employment

2008-present: Systems Scientist, Special Faculty, Carnegie Mellon University, Pittsburgh.

2007-2008: Postdoctoral Researcher, Carnegie Mellon University, Pittsburgh.

## Refereed Publications

- [11] I. Koutis, G. Miller, D. Tolliver, Combinatorial preconditioners and multilevel solvers for problems in computer vision and image processing, 2009, In: *Proceedings of the 5th International Symposium on Visual Computing, ISVC 2009*.
- [10] Ioannis Koutis and Ryan Williams, Limitations and applications of group algebras for parameterized problems, In: *Proceedings of the 35<sup>th</sup> International Colloquium on Automata, Languages and Programming, ICALP 2009*.
- [9] C. Tsourakakis, P. Drineas, E. Michelakis, I. Koutis, C. Faloutsos, Spectral counting of triangles in power-law networks via element-wise sparsification, In: *Proceedings of the 2009 International Conference on Advances in Social Networks Analysis and Mining, ASONAM 2009*.
- [8] Ioannis Koutis, Faster algebraic algorithms for path and packing problems. In: *Proceedings of the 35<sup>th</sup> International Colloquium on Automata, Languages and Programming, ICALP 2008*.
- [7] Ioannis Koutis and Gary L. Miller, Graph partitioning into isolated, high conductance clusters: theory, computation and applications to preconditioning. In: *Proceedings of the 20<sup>th</sup> Symposium on Parallelism in Algorithms and Architectures, SPAA 2008*.
- [6] D. Tolliver, I. Koutis, H. Ishikawa, J.S. Schuman, and G.L. Miller, Unassisted segmentation of multiple retinal layers via spectral rounding. In *the Association of Research in Vision and Ophthalmology, ARVO 2008 Annual Meeting*.
- [5] Ioannis Koutis and Gary L. Miller, A linear work,  $O(n^{1/6})$  time, parallel algorithm for solving planar Laplacians. In: *Proceedings of the 18<sup>th</sup> ACM-SIAM Symposium on Discrete Algorithms, SODA 2007*.
- [4] Ioannis Koutis, Parameterized complexity and improved inapproximability for computing the largest  $j$  simplex in a  $V$ -polytope. In: *Information Processing Letters* 1, No. 1, pp. 8–13, 2006.

[3] Ioannis Koutis, A faster parameterized algorithm for set packing. In: *Information Processing Letters*, No. 1, pp. 4–7, 2005.

[2] Ioannis Koutis, On the hardness of multivariate integration. In: *Proceedings of the 6<sup>th</sup> International Workshop on Approximation Algorithms for Combinatorial Optimization Problems*, pp. 122–128, APPROX, 2003.

[1] C. Bekas, E. Kokiopoulou, I. Koutis and E. Gallopoulos, Parallel computation of matrix pseudospectra. In: *Proceedings of the 15<sup>th</sup> ACM International Conference On Supercomputing, ICS 2001*, pp. 260–269.

## Other Publications and Preprints

[4] Ioannis Koutis, An unconditional lower bound for integrating multivariate functions in the oracle model, 2008, *In Preparation*.

[3] Ioannis Koutis, Dimensionality restrictions on sums over  $\mathbb{Z}_p^d$ , 2007, *CMU-CS-07-103 Technical Report*.

[2] Ioannis Koutis, Spectrum through pseudospectrum, 2001, *Arxiv Report No 0701368*.

[1] Ioannis Koutis and Efstratios Gallopoulos, Iterations on domains for computing the matrix pseudospectrum, 1999, *Manuscript*.

## Patents

CMU patent filed: I. Koutis and G. L. Miller.  
Title: *Method and apparatuses for solving weighted planar graphs*.

CMU provisional patent filed: I. Koutis and G. L. Miller.  
Title: *Methods for solving graph Laplacians*.

## Grants

Co-investigator in the University of Pittsburgh Medical Center (UPMC) grant for the development of new medical imaging methods based on spectral approaches [\$700k over 2 years]

Contributed in the proposal writing for NSF Grant "Spectral graph theory and its applications" [\$1M over 3 years]

## Awards and Honors

2007 SIAM student travel support for CSC07.

2002 SIAM student travel award.

1999 Best Engineering Student award from the Technical Chamber of Greece.

1993-1998 Yearly awards from the Greek State Scholarships Foundation.

## Invited Talks

*M-matrix systems and solvers in Computer Science*,  
University of Wyoming, March 30, 2009

*Spectral Graph Theory meets Practice: The Combinatorial Multigrid Solver*,  
Yale University, January 23, 2009

*Advances in the Theory and Computation of Pseudospectra*,  
Matrix Spectra and Pseudospectra Minisymposium, SIAM 50th Anniversary and Annual Meeting,  
July 8-12, 2002, Philadelphia, PA.

## Conference and Workshop Presentations

*The Combinatorial Multigrid Solver*, The 14<sup>th</sup> Copper Mountain Conference on Multigrid Methods,  
March 2009, [with Gary L. Miller]

*A Linear Work, Parallel Algorithm for Solving Planar Laplacians*, Combinatorial Scientific Computing (CSC07), Costa Mesa, California, February 2007, [with Gary L. Miller].

*Efficiently Solving Linear systems using Support Tree Preconditioners*, Parallel Processing for Scientific Computing (PP06), San Francisco, California, February 2006, [with Gary L. Miller].

*Hermitian Methods for Computing Eigenvalues*, 5th IMACS Conference on Iterative Methods in Scientific Computing, May 2001, [with E. Gallopoulos].

*Iterations on Domains for the Computation of Matrix (Pseudo)-Spectrum*, 2nd Conference on the Foundations of Computational Mathematics (FOCM), Oxford, July 1999, [with E. Gallopoulos].

## Professional Service

Referee for FOCS 2008, STACS 2007, SPAA 2006, Algorithmica, SIMAX, ACM TALG, APNUM, ESA 2009, IPL, FTTCS 2009.

## Teaching Experience

Teaching Assistant, Principles of Programming, CMU, Spring 2002.

Teaching Assistant, Formal Languages Automata and Computation, CMU, Spring 2001.

Teaching Assistant, Advanced Scientific Computing, University of Patras, Fall 1999.

## Languages

Greek - Native.

English - Very Fluent in Reading, Writing, Comprehension, Speaking.

French - Fluent in Reading and Comprehension. Writing and Speaking not practiced recently.