



# Drosos Kourounis

## Curriculum Vitae

### Research Experience

- 2012–Present **Senior Researcher**, *Università della Svizzera italiana*, Institute of Computational Science, Lugano, Switzerland.
- 2009–2011 **Postdoc**, *Department of Energy Resources Engineering*, Stanford University, Stanford, CA, USA.

### Research Interests

- Optimal Power Flow
- Optimal Gas Flow
- Smart grids
- Smart fields
- Interior point methods
- PDE Constrained Optimization
- Seismic Inversion
- Reservoir Simulation
- Parallel Sparse Linear Solvers
- Domain Decomposition

### Education

- 2003–2008 **PhD**, *Department of Materials Science and Engineering*, University of Ioannina, Ioannina, Greece.
- 1995–2000 **Engineer's Degree**, *School of Electrical and Computer Engineering*, Aristotle University of Thessaloniki, Thessaloniki, Greece.

### PhD Thesis

- Title *Boundary value problems with applications to biomedical engineering.*
- Supervisor Professor Antonios Charalambopoulos

### Teaching

- Spring 2018 Reservoir simulation, School Mineral Resources Engineering, Technical University of Crete (5 ECTS)

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- Fall 2017 Software Atelier: Partial Differential Equations, Kourounis D., SA 2017-2018 (3 ECTS)
- Spring 2017 Reservoir simulation, School Mineral Resources Engineering, Technical University of Crete (5 ECTS)
- Fall 2016 Software Atelier: Partial Differential Equations, Kourounis D., SA 2016-2017 (3 ECTS)
- Fall 2016 TA, Software Atelier: Simulation, Data Science & Supercomputing (6 ECTS)
- Spring 2016 Reservoir simulation, School Mineral Resources Engineering, Technical University of Crete (5 ECTS)
- Spring 2016 Lecture in Advanced Materials, Department of Material Sciences and Engineering, University of Ioannina, (4 ECTS)
- Fall 2015 PDE Software Lab (4 ECTS)
- Spring 2015 TA, Software Atelier: Supercomputing and Simulations
- Fall 2014 PDE Software Lab (4 ECTS)
- Spring 2013 TA, Computational Science (6 ECTS)
- Spring 2012 TA, Computational Science (6 ECTS)

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## Research Grants

- 2017–2018 CHF 1,145,614 (USI: CHF 242,324) on “Efficient Simulation and Optimization for Reliable Intercoupled Multi-Energy Carrier Systems” PI: G. Hug (ETH Zurich), D. Kourounis (USI), O. Schenk (USI), Partner: NEPLAN, Zurich.

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## Patent Application

- Patent EPO D. Kourounis, O. Schenk, *METHOD TO ACCELERATE THE PROCESSING OF MULTIPERIOD OPTIMAL POWER FLOW PROBLEMS*, USI002BWO, PCT/EP2017/057632, March 30, 2018.

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## Awards

- 1995 Golden Medal, Pan-Hellenic Mathematics Competition
- 1995 Participant, 36th International Mathematical Olympiad, Toronto, Canada

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## Papers in peer-reviewed journals

- IEEE Trans. Power Syst. Drosos Kourounis, Alexander Fuchs, Olaf Schenk, *Towards the next generation of multiperiod optimal power flow solvers*, IEEE Transaction on Power Systems, accepted, online  
<http://ieeexplore.ieee.org/document/8245855/>
- J. Comput. Sci. F. Verbosio, A. De Coninck, D. Kourounis, O. Schenk, *Enhancing the Scalability of Selected Inversion Factorization Algorithms in Genomic Prediction*, September 2017, Journal of Computational Science  
<http://dx.doi.org/10.1016/j.jocs.2017.08.013>
- GENETICS Arne De Coninck, Bernard De Baets, Drosos Kourounis, Fabio Verbosio, Olaf Schenk, Steven Maenhout, Jan Fostier, *Needles: Towards Large-Scale Genomic Prediction with Marker-by-Environment Interaction*, GENETICS, 202(2), pp. 1–12, 2016.  
<http://dx.doi.org/10.1534/genetics.115.179887>

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- COMG D. Kourounis and O. Schenk, *Constraint handling for gradient-based optimization of compositional reservoir flow*, Journal of Computational Geosciences, pp. 1–14, 2015.  
<http://dx.doi.org/10.1007/s10596-015-9524-5>
- EUROGRAPHICS D. Boscaini, D. Eynard, D. Kourounis, M. M. Bronstein, *Shape-from-Operator: recovering shapes from intrinsic operators*, Computer Graphics Forum (EUROGRAPHICS), 34(2), pp. 265–274, 2015.  
<http://dx.doi.org/10.1111/cgf.12558>
- SISC M. J. Grote, J. Huber, D. Kourounis and O. Schenk, *Inexact Interior-Point Method for PDE-Constrained Nonlinear Optimization*, SIAM J. Sci. Comput., 36(3), A1251–A1276, 2014.  
<http://dx.doi.org/10.1137/130921283>
- COMG D. Kourounis, L.J. Durlofsky, J. D. Jansen and K. Aziz, *Adjoint formulation and constraint handling for gradient-based optimization of compositional reservoir flow*, Journal of Computational Geosciences, 18(2), pp.117–137, 2014.  
<http://dx.doi.org/10.1007/s10596-013-9385-8>
- IMAJNA M. Arioli, D. Kourounis and D. Loghin, *Discrete fractional Sobolev norms for domain decomposition preconditioning IMA Journal of Numerical Analysis*, May 2012,  
<http://imajna.oxfordjournals.org/content/early/2012/05/04/imanum.drr024.abstract>
- CMES D. Kourounis, L. N. Gergidis, and A. Charalambopoulos, *Sensitivity of the acoustic scattering problem in prolate spheroidal geometry with respect to wavenumber and shape.*, Computer Modeling in Engineering and Sciences, June 2008,  
<http://www.techscience.com/doi/10.3970/cmes.2008.028.185.html>
- IJNMF M. Möller, D. Kuzmin and D. Kourounis, *Implicit FEM-FCT algorithms and discrete Newton methods for transient convection problems*. International J. for Numerical Methods in Fluids, 2007.  
<http://www3.interscience.wiley.com/cgi-bin/fulltext/116841348/PDFSTART>
- CMES L. N. Gergidis, D. Kourounis, S. Mavratzas and A. Charalambopoulos, *Acoustic scattering in prolate spheroidal geometry via Vekua transformation–Theory and numerical results*. Computer Modeling in Engineering and Sciences, 21(2), pp 157–176 (2007). <http://dx.doi.org/0.3970/cmes.2007.021.157>
- CPC A. Charalambopoulos, D. I. Fotiadis, D. Kourounis and C. V. Massalas, *On the solution of boundary value problems using spheroidal eigenvectors*. Computer Physics Communications, 139(2), pp 153–171 (2001).  
[http://dx.doi.org/10.1016/S0010-4655\(01\)00206-5](http://dx.doi.org/10.1016/S0010-4655(01)00206-5)

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## Papers in peer-reviewed conference proceedings

- PASC18 Simpson T., Pasadakis D., Kourounis D., Fujita K., Yamaguchi T., Tsuyoshi I., Schenk O., *Balanced Graph Partition Refinement using the Graph  $p$ -Laplacian*. Proceedings of the ACM Platform for Advanced Scientific Computing Conference. PASC18, Basel, Switzerland. July 2-4, 2018.
- PSCC O Malley C., Roald L., Kourounis D., Hug G., Schenk O., *Security Assessment in Gas-Electric Networks*, IEEE Xplore Proceedings of the 20th Power Systems Computation Conference, PSCC 2018, 20th Power Systems Computation Conference, Dublin, Ireland. June 11-15, 2018.

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- ENERGYCON O Malley C., Kourounis D., Hug G., Schenk O., *Finite Volume Methods for Transient Modeling of Gas Pipelines*, IEEE Xplore Proceedings of the 5th IEEE International Energy Conference ENERGYCON, Limassol, Cyprus. Jun 3-7, 2018
- PDP A. De Coninck, D. Kourounis, F. Verbosio, O. Schenk, B. De Baets, S. Maenhout, J. Fostier, *Towards Parallel Large-Scale Genomic Prediction by Coupling Sparse and Dense Matrix Algebra*, 23rd Euromicro International Conference on Parallel, Distributed and Network-Based Processing (PDP), 747-750, 2015.  
<http://dx.doi.org/10.1109/PDP.2015.94>
- ONEPETRO R. Rwechungura, E. Bhark, O.T. Miljeteig, A. Suman, D. Kourounis, B. Foss, L. Hoier, J. Kleppe, *Results of the First Norne Field Case on History Matching and Recovery Optimization Using Production and 4D Seismic Data*, SPE Annual Technical Conference and Exhibition, 8-10 October 2012, San Antonio, Texas, USA,  
<https://www.onepetro.org/conference-paper/SPE-157112-MS>
- ECMORXII D. Kourounis, D. Voskov, K. Aziz, *Adjoint Methods for Multicomponent Flow Simulation*, 12th European Conference on the Mathematics of Oil Recovery, September 2010.  
<http://earthdoc.eage.org/publication/publicationdetails/?publication=41315>
- MMSTBT D. Kourounis, A. Charalambopoulos, and D.I. Fotiadis, *Human head interaction with mobile phones: the spheroidal head model.*, Proceedings of the Fifth International Workshop on Mathematical Methods in Scattering Theory and Biomedical Technology, pp. 319-335, 2002, Corfu, Greece.  
[http://www.worldscientific.com/doi/abs/10.1142/9789812777140\\_0027](http://www.worldscientific.com/doi/abs/10.1142/9789812777140_0027)

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## Conferences

### 2018

- March, *Towards the Next Generation of Multiperiod Optimal Power Flow Solvers*, SIAM Conference on Parallel Processing for Scientific Computing, Tokyo, Japan
- SIAM PP18
- March, *Security Constrained Optimization of Large Scale Energy Systems on High Performance Computers*, SIAM Conference on Parallel Processing for Scientific Computing, Tokyo, Japan
- SIAM PP18
- March, *Balanced Partition Refinement with the Graph  $p$ -Laplacian*, SIAM Conference on Parallel Processing for Scientific Computing, Tokyo, Japan
- SIAM PP18

### 2015

- July, *The Identifiability Approach for Time-Dependent Full Waveform Inversion*, 22nd ISMP15 International Symposium on Mathematical Programming, Pittsburg, US
- SIAM GS15
- June, *Full Waveform Inversion for the Identifiable Subspace using Interior Point Methods*, SIAM Conference on Mathematical and Computational Issues in the Geosciences, Stanford, US
- PASC15
- June, *Full Waveform Inversion for the Identifiable Subspace*, Platform for Advanced Scientific Computing Conference, Zurich, Switzerland
- GAMM15
- March, *The Identifiability Approach for Seismic Inversion*, 86th Annual Meeting of the International Association of Applied Mathematics and Mechanics, Lecce, Italy
- NSABS-2015
- January, *Including explicit marker-by-environment interaction for large scale genomic prediction*, Arne De Coninck, Fabio Verbosio, Drosos Kourounis, Olaf Schenk, Bernard De Baets, Steven Maenhout and Jan Fostier, 20th National Symposium for Applied Biological Sciences, Université catholique de Louvain, Louvain, Belgium

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## 2014

- June, *Constraint handling for optimization of compositional reservoir flow*, Platform for PASC14 Advanced Scientific Computing Conference, Zurich, Switzerland
- September, *Constraint handling for gradient-based optimization of compositional reservoir flow*, NUMAN14 Sixth Conference on Numerical Analysis, Chania, Creta
- September, *Adjoint Methods in Computational Science, Engineering, and Finance*, Dagstuhl DAGSTUHL Seminar 14371, Dagstuhl, Germany

## 2013

- April, *Optimization of oil recovery subject to non-differentiable constraints using adjoint gradient-based methods*, Swiss Numerics Colloquium, EPFL, Lausanne, Switzerland
- June, *PDE-Constrained Optimization with Inequality Constraints: Combining Full Space and Reduced Space*, SIAM Conference on Mathematical and Computational Issues in the Geosciences, University of Padova, Italy
- May, *Constraint handling for gradient-based optimization of compositional reservoir flow*, INTERPORE 5th International Conference on Porous Media, Prague, Czech Republic

## 2011

- June, *Adjoint Gradient-based optimization of the Norne benchmark case using Eclipse and AD-GPRS*, IO11 The 7th International Conference on Integrated Operations in the Petroleum Industry, IO Center, Trondheim, Norway

## 2010

- September, *Adjoint Methods for Multicomponent Flow Simulation*, ECMORXII 12th European Conference on the Mathematics of Oil Recovery, Oxford, UK

## 2001

- October MMSTBT D. Kourounis, A. Charalambopoulos, and D.I. Fotiadis, *Human head interaction with mobile phones: the spheroidal head model.*, Fifth International Workshop on Mathematical Methods in Scattering Theory and Biomedical Technology, Corfu, Greece.

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## Invited talks

### 2015

- May *Optimization of oil field operations*, School of Mineral Resources Engineering, Chania, Creta, Greece
- March *Constraint handling for gradient-based optimization of compositional reservoir flow*, National Technical University of Athens, Athens, Greece

### 2014

- December *Constraint handling for gradient-based optimization of compositional reservoir flow*, Department of Civil Engineering and Geosciences, Delft University of Technology, Delft, Netherlands

### 2013

- March *Adjoint methods for compositional flow in porous media for optimization of oil-recovery*, Seminar of Numerical Analysis, Department of Geophysics, ETH, Zurich, Switzerland

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## 2012

- October *Adjoint methods for gradient-based optimization of oil recovery*, Department of Mathematics, University of Basel, Basel, Switzerland
- August *The Constrained Pressure Residual (CPR) preconditioning strategy in reservoir simulation*, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany

## 2011

- November *Adjoint Gradient-based optimization in AD-GPRS*, The 6th Smart Fields Annual Meeting, Department of Energy Resources Engineering, Stanford University, Stanford, US
- November *Adjoint gradient-based optimization of compositional flow*, Smart Fields Affiliates: Transition and Review Meeting, Department of Energy Resources Engineering, Stanford University, Stanford, US
- June *Gradient-based optimization in AD-GPRS*, Norwegian University of Science and Technology, Trondheim, Norway
- June *Adjoint formulations for gradient-based optimization of compositional flow*, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany

## 2010

- November *Adjoint gradient-based optimization of compositional flow*, Advanced Wells and Smart Fields Affiliates: Transition and Review Meeting, Department of Energy Resources Engineering, Stanford University, Stanford, US
- May *Gradient-based optimization in AD-GPRS*, The 5th Smart Fields Annual Meeting, Department of Energy Resources Engineering, Stanford University, Stanford, US

## 2009

- April *Optimization tools in AD-GPRS*, The 4th Smart Fields Annual Meeting, Department of Energy Resources Engineering, Stanford University, Stanford, US
- January *Optimal domain decomposition algorithms based on interpolation of Sobolev spaces*, Institute for Computational & Mathematical Engineering, Stanford University, Stanford, US

## 2007

- May *Ill conditioned matrices in semi-analytical methods applied for the solution of scattering problems*, Midlands Numerical Analysis Group, University of Leicester

## 2005

- November *Recent advances in the FCT stabilization method*, University of Dortmund, Department of Mathematics
- October *The FCT stabilization method for convection-diffusion problems*, Weierstrass Institute for Applied Analysis and Stochastics, Berlin, Germany