Panagiotis Tsilifis

Curriculum Vitae

2343 Scarff St, Apt. 201
90007 Los Angeles, CA, USA
☎ *+1 (213) 234-8642*
✉ *tsilifis@usc.edu*

Education

Aug 2016 **University of Southern California**, *Ph.D. in Applied Mathematics*.
Dissertation title : *Design, adaptation and variational methods in Uncertainty Quantification*
Research advisor: Prof. Roger G. Ghanem.

Aug 2014 **University of Southern California**, *M.A. in Applied Mathematics*.

June 2011 **National Technical University of Athens, Greece**, *M.Sc. in Applied Mathematical Sciences*.

09/08 - 06/09 **Royal Institute of Technology (KTH), Sweden**.
Erasmus visiting student, no degree earned

Sep 2009 **National Technical University of Athens, Greece**, *Diploma in Applied Mathematical & Physical Sciences*.

Work Experience - Appointments

Professional

08/16 - Now **University of Southern California**, *Postdoctoral Scholar - Research Associate*.
Dept. of Civil Engineering, Viterbi School of Engineering

Project Uncertainty Quantification in Large-Eddy simulation (LES) computations of turbulent multiphase combustion in a SCRAMJET engine (DARPA EQUIPS program-DARPA-BAA-15-13)

Feb - March '17 **World Bank Group**, *Short-term Consultant*.
Multilateral Investment Guarantee Agency (MIGA)

Summary
· Further developed and modified the Sovereign Ratings forecasting model to include MIGA internal ratings.
· Performed sensitivity analysis to exploit the role and importance of governance and GDP as parameters driving the ratings outcome of each country and provided a users' manuals for future use of the model including guidance through the Python code and to incorporating additional future datasets.
· Pinpoint and discussed possible patterns and the overall performance of the model with economic experts and staff members.

May - July '16 **World Bank Group**, *Short-term Consultant*.
Multilateral Investment Guarantee Agency (MIGA)

Summary
· Developed a data-driven Sovereign Ratings forecasting model using external ratings, governance and economic data.
· Investigated predictive capabilities of Gaussian Process-based GARCH models tested on GDP and governance indicators data.
· Implemented the forecasting model in Python and provided short-term forecasting outputs for a large number of countries that are not rated by rating agencies (S&P, Fitch or Moody's).

10/10 - 12/10 **Biomedical Research Foundation, Academy of Athens**, *Biological Imaging Unit*.
Intern, research assistant in Imaging applications in ImageJ, Fiji and Volocity software

10/07 - 01/08 **National Observatory of Athens**, *Institute of Astronomy and Astrophysics*.
Intern, research assistant in Telescope image processing (linux software)

Research

01/15 - 08/16 **University of Southern California**, *Graduate Research Assistant*.
Dept. of Aerospace and Mechanical Engineering, Viterbi School of Engineering

Projects Bacterial growth modeling using stochastic differential equations (SDEs) and dynamical systems with random parameters (SBIR grant by US Air Force office of Scientific Research)

Teaching

08/11 - 12/14 **University of Southern California**, *Graduate Teaching Assistant*.
Dept. of Mathematics, Dornsife College of Letters, Arts & Sciences

Courses taught *Math 126: Calculus II* - Fall 2011, Spring 2012.
Math 226: Calculus III - Fall 2012.
Math 225: Linear Algebra and Linear Differential equations - Spring 2013,
Math 525a: Real Analysis, Math 541b: Statistics II - Fall 2013,
Math 501: Numerical analysis, Math 541a: Statistics I - Spring 2014.

Academic Service

Reviewer **Journal of Computational Physics (Elsevier)**.
SIAM/ASA Journal on Uncertainty Quantification.
American Institute of Aeronautics & Astronautics (AIAA) Journal.

Publications

Journals **Compressive sensing adaptation for polynomial chaos expansions**, *P. Tsilifis, X. Huan, C. Safta, K. Sargsyan, G. Lacaze, J. Oefelein, H. Najm, R. Ghanem*, Journal of Computational Physics (submitted) https://arxiv.org/abs/1801.01961, 2018.

Reduced-dimensionality Legendre Chaos expansions via basis adaptation on 1d active subspaces, *P. Tsilifis*, ASME Journal of Verification, Validation and Uncertainty Quantification (submitted), 2017.

The stochastic quasi-chemical model for bacterial growth: Variational Bayesian parameter update, *P. Tsilifis, W.J. Browning, T.E. Wood, P.K. Newton, R.G. Ghanem*, Journal of Nonlinear Science https://doi.org/10.1007/s00332-017-9411-4, 2017.

Homogeneous Chaos basis adaptation for design optimization under uncertainty: Application to the oil well placement problem, *C. Thimmisetty, P. Tsilifis, R. Ghanem*, Artificial Intelligence for Engineering Design, Analysis and Manufacturing 31 265-276, 2017.

Reduced Wiener Chaos representation of random fields via basis adaptation and projection, *P. Tsilifis, R.G. Ghanem*, Journal of Computational Physics 141 102-120, 2017.

Efficient Bayesian experimentation using an expected information gain lower bound, *P. Tsilifis, R.G. Ghanem, P. Hajali*, SIAM/ASA Journal on Uncertainty Quantification 5 (1) 30-62, 2017.

Computationally efficient variational approximations for Bayesian inverse problems, *P. Tsilifis, I. Bilionis, I. Katsounaros, N. Zabaras*, ASME Journal of Verification, Validation and Uncertainty Quantification 1 (3) 031004, 2016.

Markov Chain Monte Carlo inference of parametric dictionaries for sparse Bayesian approximations, *T. Chaspari, A. Tsiartas, P. Tsilifis, S. Narayanan*, IEEE Transactions on Signal Processing 64 (12) 3077-3092, 2016.

Cubic-quintic long-range interactions with double-well potentials, *P.A. Tsilifis, P.G. Kevrekidis, V.M. Rothos*, Journal of Physics A, 47 (3) 035201, 2014.

Proceedings **Variational reformulation of Bayesian inverse problems**, *P. Tsilifis, I. Bilionis, I. Katsounaros, N. Zabaras*, ECCOMAS 1^{st} International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP2015), Crete island, Greece, 25-27 May, 2015.

Theses **Design, Adaptation and Variational Methods in Uncertainty Quantification, *Doctoral Dissertation***, *P. Tsilifis*, University of Southern California, 2016.

Nonlocal Soliton Dynamics, *Master Thesis*, *P.A. Tsilifis*, National Technical University of Athens, 2011.

Stability of Solitons to the Nonlinear Schrödinger Equation, *Diploma Thesis*, *P.A. Tsilifis*, National Technical University of Athens (in Greek), 2009.

Conferences / Talks

Invited Talks

Efficient methods for Bayesian experimental design and inference and dimensionality reduction for Polynomial Chaos expansions, Combustion Research Facility, Sandia National Labs, Livermore, CA, USA, September 27, 2017.

Gaussian Process regression for Sovereign Ratings forecasting, MIGA department, World Bank Group, Washington, D.C., USA, November 15, 2016.

Talks-Abstracts

Basis adaptation on active subspaces for generalized Polynomial Chaos, *P. Tsilifis*, FOMICS Workshop on Uncertainty Quantification, ICS, Università della Svizzera Italiana, Lugano, Switzerland, December 15-19, 2016.

Variance Reduction Methods for Efficient Bayesian Experimental Design, *P. Tsilifis, R. Ghanem*, SIAM Conference on Uncertainty Quantification (UQ16), EPFL Campus, Lausanne, Switzerland, April 5-8, 2016.

Variational Bayesian inference using basis adaptation in Homogeneous Chaos surrogates, *P. Tsilifis, R. Ghanem*, SIAM Conference on Uncertainty Quantification (UQ16), EPFL Campus, Lausanne, Switzerland, April 5-8, 2016.

Posters

Polynomial Chaos basis adaptation for uncertainty propagation and design optimization on an SCRAMJET engine, *P. Tsilifis, R. Ghanem, Z. Vane, G. Lacaze, J. Oefelein, H. Najm*, ASACM Workshop on Uncertainty Quantification & Data-Driven Modeling, Austin, TX, March 23-24, 2017.

Optimal Bayesian experimental design for subsurface characterization of contaminated areas, *P. Tsilifis, R. Ghanem, P. Hajali*, CNLS Conference on Data Analysis (CoDA2016), Santa Fe, NM, March 2-4, 2016.

Optimal Bayesian experimental design for contaminant transport under uncertainty, *P. Tsilifis, R. Ghanem*, USACM 13th US National Congress on Computational Mechanics (USNCCM13), San Diego, CA, July 26-30, 2015.

Optimal Bayesian experimental design for permeability identification in the presence of contaminants, *P. Tsilifis, R. Ghanem*, SIAM Conference on Mathematical and Computational Issues in the Geosciences (GS15), Stanford University, Stanford, CA, July 1, 2015.

Variational reformulation of Bayesian inverse problems, *P. Tsilifis, I. Bilionis, N. Zabaras*, SIAM Conference on Computational Science and Engineering (CSE15), Salt Lake city, UT, March 14, 2015.

Skills

Programming

object-oriented

Python.
Packages: NumPy, SciPy, scikit-learn, pandas, Keras, GPy, FiPy, PyTOUGH, PyMC, xlrd.
Currently developing a generic UQ toolbox "chaos_toolbox" with emphasis on Polynomial Chaos capabilities and a Polynomial Chaos basis adaptation module "chaos-basispy" (`github.com/tsilifis/chaos_basispy`)

scientific

MATLAB, R, Mathematica.

database

SQL (MySQL).

collaborating

Git, bitbucket, svn.
Github: `github.com/tsilifis`

business

LaTeX, MS Office^{TM} (Excel, Word, PowerPoint).

reservoir modeling

TOUGH2, GMS.

Languages

Greek — Native

English — Fluent

Honors and Awards

December 2016 **USC Postdoctoral Scholar Training and Travel Award**, FOMICS Winter School in Uncertainty Quantification, Lugano, Switzerland.

April 2016 **SIAM Student Travel Award**, SIAM Conference on Uncertainty Quantification (uq16), Lausanne, Switzerland.

March 2015 **SIAM Student Travel Award**, SIAM Conference on Computational Sciences & Engineering (cse15), Salt Lake City, UT, USA.

June 2013 **Gerondelis Fellowship**, Gerondelis Foundation Inc., MA, USA.

March 2010 **1st prize Scholarship for Graduate Studies**, State Scholarships Foundation (IKY), Greece, (awarded to 2 students every year).

August 2008 **Erasmus Scholarship for Exchange Students**, State Scholarships Foundation (IKY), Greece.

Personal Information

Date of birth May 31, 1985

Place of birth Patra, Achaia, Greece

Nationality Greek

References

Roger G. Ghanem.
Gordon S. Marshall Professor of Engineering Technology
Sonny Astani Department of Civil and Environmental Engineering Viterbi School of Engineering,
University of Southern California
Tel: +1 (213) 590-3617
email: ghanem@usc.edu

Paul K. Newton.
Professor of Aerospace & Mechanical Engineering, Mathematics and Norris Comprehensive Cancer Center
Viterbi School of Engineering,
University of Southern California
Tel: +1 (213) 740-7782
email: paulknewton@gmail.com

Ilias Bilionis.
Assistant Professor of Mechanical Engineering
School of Mechanical Engineering,
Purdue University
Tel: +1 (765) 496-0217
email: ibilion@purdue.edu