

# Curriculum Vitae

*Emmanuel N. Mathioudakis*



## PERSONAL RECORD

**Name:** Emmanuel N. Mathioudakis  
**Citizenship:** Hellenic  
**Current Employment:** Associate Professor  
School of Mineral Resources Engineering,  
Technical University of Crete.  
**Affiliate:** Member of the Applied Mathematics and  
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Technical University of Crete.  
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## EDUCATION

- Ph.D. in Computational and Applied Mathematics, Department of Sciences, Technical University of Crete, Chania, Greece, 2001.  
Thesis Title : *“Iterative methods for the solution of large linear systems on parallel architectures”*.
- M.Sc. in Numerical Analysis and High Performance Computing, Department Sciences, Technical University of Crete, Chania, Greece, 1996.  
Thesis Title : *“Scientific computations on parallel environments”*.
- B.Sc. (Ptychion) in Mathematics, Department of Mathematics, University of Crete, Greece, 1993.

## RESEARCH INTERESTS

My research interests lay in the area of Computational Mathematics and Scientific Computing and more precisely in the area of **Numerical Linear Algebra** and **High performance and Parallel Computing**. Specifically, I'm interested in the following scientific areas:

- Parallel Algorithms/Scientific Computing
- Numerical methods for solving PDEs
- Iterative methods for solving large and sparse linear systems

## **APPOINTMENTS/PROFESSIONAL EXPERIENCE**

- **2019 – Today** : Associate Professor (*Scientific Computing*), School of Mineral Resources Engineering , Technical University of Crete.
- **2013 – 2019** : Assistant Professor (*Scientific Computing*), School of Mineral Resources Engineering , Technical University of Crete.
- **2008 – 2013** : Assistant Professor (*Scientific Computing*), Department of Sciences, Technical University of Crete.
- **2004 – 2008** : Lecturer (*Scientific Computing*), Department of Sciences, Technical University of Crete.
- **2001 – 2004** : Visiting Lecturer, Dept of Sciences, Technical University of Crete.

## **OTHER INFORMATION**

Military service at the Hellenic AirForce, September 1998–May 2000.

### **LANGUAGES**

Greek - native or bilingual proficiency.

English - excellent command of written and spoken.

## **TEACHING EXPERIENCE**

### **Principal Lecturer**

Dept. of Mineral Resources Engineering – Dept. of Environmental Engineering, Technical University of Crete, Compulsory Undergraduate Courses:

- 2013 – today Numerical Linear Algebra
- 2013 – today Numerical Methods
- 2014 – today Scientific Computing
- 2014 – today Computer Programming

Dept. of Sciences, Technical University of Crete, Compulsory Undergraduate Courses:

- 2004 – 2013 Scientific Computing
- 2004 – 2013 Computer Programming
- 2001 – 2004 Numerical Linear Algebra
- 2001 – 2004 Numerical Analysis

School of Production Engineering and Management/Dept. of Sciences, Technical University of Crete, Postgraduate Courses:

- 2014 – today High Performance Computing
- 2004 – 2009 Matrix Computations and Iterative Methods
- 2004 – today Scientific / Parallel Computing
- 2004 – today Numerical Methods for PDEs (Finite Elements)

### **Teaching Assistant**

Dept. of Sciences, Technical University of Crete, Compulsory Undergraduate Courses:

- 1993 - 2001 Computer Programming - Numerical Linear Algebra – Numerical Analysis

## UNIVERSITY SERVICE

- 2018 – Today Member of Graduate Studies Committee – School of Mineral Resources Engineering , Technical University of Crete.
- 2009 – Today Member of scientific committee of TUC Grid Computer.
- 2004 – 2013 Member of Graduate Studies Committee – Dept. of Sciences.
- 2004 – 2005 Member of University Senate.

## PhD STUDENTS

- N. Pachakis, "*Hydrodynamic simulations for Navier-Stokes incompressible flow equations*".
- K. Spanakis, "*Novel and robust mathematical techniques for the automatic alignment of image data*", 2020.
- V. Mandikas, "*Parallel Multigrid techniques for Navier-Stokes solvers simulating incompressible flows*", 2017.

## MASTER STUDENTS

1. S. Karamoutsos, "*High order numerical simulations for seismic wave propagation*", 2020.
2. A. Koutelidakis, "*Numerical Compact finite differences discretization schemes simulating seismic wave propagation*", 2019.
3. N. Eleftheriou, "*Cyclic reduction scientific computations for Hermite Collocation finite elements*", 2017.
4. E. Gaitani, "*Numerical forecasting of climate change for future coastal tourism management*", 2017.
5. K. Spanakis, "*An Extended Numerical method for Image Registration*", 2014.
6. N. Charalampaki, "*MultiGrid techniques for Parallel Computing Architectures with Accelerators*", 2014.
7. N. Vilanakis, "*GPU Numerical solution of large linear systems arising from Finite Element Methods in high performance computing architectures using Graphics Processing Units*", 2013.
8. J. Athanasakis, "*GPU scientific computations for Hermite Collocation Finite Element Method*", 2012.
9. A. Apostolou, "*Grid Computations and Compact Finite Difference methods for elliptic PDEs*", 2012.
10. B. Mandikas, "*Grid Computations for the Multigrid finite element Hermite Collocation method*", 2008.
11. E. Petrakis, "*Parallel numerical schemes for hydrodynamic flows*", 2006.

## COMPUTING SKILLS

- Programming languages: FORTRAN, C , MatLab, HPC with MPI – OpenMP & OpenACC
- Scientific computing software MatLab, Maple and NETLIB routines.
- Sys adm knowledge of UNIX based parallel (multiprocessor / grid) systems

## AWARDS

- Best Paper Award of World Congress on Engineering 2015 - *The 2015 International Conference of Parallel and Distributed Computing : I.E. Athanasakis, N.D. Vilanakis and E.N. Mathioudakis "Solving Discontinuous Collocation Equations for a Class of Brain Tumor Models on GPUs", Lecture Notes in Engineering and Computer Science, Procs of WCE2015, (2217), pp. 529-534, International Association of Engineers, Imperial College, UK*
- Best Paper Award of *The 2013 International Conference of Parallel and Distributed Computing : Em. Mathioudakis, N. Vilanakis, E. Papadopoulou and Y. Saridakis "Parallel Iterative Solution of the Hermite Collocation Equations on GPUs", Procs of World Congress On Engineering 2013-WCE 2013, London, UK*
- Certificate of Merit for *The 2013 International Conference on Applied and Engineering Mathematics : V. Mandikas, Em. Mathioudakis, E. Papadopoulou and N. Kampanis "A high order accurate multigrid pressure correction algorithm for incompressible Navier-Stokes equations", Procs of ICAEM2013, IAENG, Imperial College, UK*

## RESEARCH PROJECTS

- 2017– today **PGI** - *Academic collaboration for deploying High Performance Applications with PGI compiler's software.*
- 2016 – today **NVIDIA Hardware Grant** - *Academic collaboration for GPU computing.*
- 2012 – 2015 **THALES** - *Advanced mathematical methods and software platform for solving multiphysics – multidomain problems on modern computer architectures : Applications to environmental engineering and medical problems. (TUC – Un. of Patras – Un. of Thessaly), member of basic research team, (600K euros).*
- 2007 – 2008 **EPEAEK** – *TUC undergraduate program upgrade. (TUC)*
- 2002 – 2007 **HRAKLEITOS** – *An Innovative method for solving Elliptic PDEs. (TUC)*
- 2004 – 2006 **ARCHIMIDES** – *Solving non-linear geophysics, air pollution and electromagnetic wave propagation problems on parallel computing architectures. (TUC – Univ. of Athens – TEI of Crete)*
- 2004 – 2005 **Basic Research Program** – *Solution of large and sparse linear systems for weather forecast numerical models on parallel architectures. (TUC)*
- 2000 – 2001 **PENED99 ED566** – *High performance computations for scientific and multimedia applications. (TUC – Univ of Patras)*
- 2000 – 2001 **PENED99 1431** – *Adaptive optics with stochastic optimization algorithms in Astronomy . (TUC – Univ of Crete)*

## CONTRIBUTED TALKS AND PRESENTATIONS

- 2016 ENH'16 – Computation and Information Science and Engineering Conference, Volos, Greece.
- 2015 MMCTSE'15 – Mathematical Methods and Computational Techniques in Science and Engineering 2015, Bratislava, Slovakia.
- 2015 ICPDC'15 - The 2015 International Conference of Parallel and Distributed Computing - World Congress on Engineering – WCE2015, Imperial College - London, U.K.
- 2014 CMA 2014 - International Conference on Mathematical and its Applications, Kuwait, 2014.

- 2013 IC-MSQUARE 2013 -2nd International Conference on Mathematical Modeling in Physical Sciences 2013, Prague, 2013.
- 2013 ICAEM 2013 - The 2013 International Conference of Applied and Engineering Mathematics, IAENG, Imperial College, U.K.
- 2013 ICPDC'13 - The 2013 International Conference of Parallel and Distributed Computing - World Congress on Engineering – WCE2013, London, U.K.
- 2010 ICCAM '10 – International Congress on Computational and Applied Maths - Leuven, Belgium
- 2010 NumAn '10 – Conference in Numerical Analysis 2010 - Chania, Greece
- 2009 HERCMA '09 – 9<sup>th</sup> Hellenic-European Research on Comp. Mathematics and its Applications - Athens, Greece
- 2009 M<sup>3</sup>ST 09 - International Conference on Modern Mathematical Methods in Science and Technology – Poros, Greece
- 2008 WCCM8 - 8<sup>th</sup> World Congress on Computational Mechanics – Venice, Italy
- 2008 ECCOMAS 2008 - 5<sup>th</sup> European Congress on Computational Methods in Applied Sciences and Engineering – Italy
- 2007 XXII International Conference on Applied Computer Science – Prague - Czech Republic
- 2006 M<sup>3</sup>ST 06 - International Conference on Modern Mathematical Methods in Science and Technology – Poros, Greece
- 2006 9<sup>th</sup> International Conference on Applied Mathematics of World Scientific and Engineering Academy - MATH '06 – Konstantinoupolis - Turkey
- 2001 NA 2001 - International Conference on Numerical Algorithms 2001 - Marrakesh – Morocco.
- 2001 ENUMATH 2001 - European Conference on Numerical Mathematics and Advanced Applications - Ischia – Italy
- 2001 5<sup>th</sup> IMACS on Iterative Methods in Scientific Computing – Heraklio, Greece
- 1998 HERCMA '98 – 4<sup>th</sup> European Research on Comp. Maths and its Applications - Greece.
- 1996 HERCMA '96 – 3<sup>th</sup> European Research on Comp. Maths and its Applications - Greece.

## **SELECTED PUBLICATIONS**

- N. Vilanakis, N. Economou, E. Mathioudakis and A. Vafeidis, “A 3D frequency-domain electromagnetic solver employing a compact finite-difference high order scheme and a multigrid preconditioning iterative technique”, *submitted*, 2020.
- Spanakis C., Mathioudakis E., Kampanis N., Tsiknakis M., Marias K., “Machine Learning Regression in evolutionary algorithms and Image Registration”, *IET Image Process.*, vol.23 (5), pp. 843-849, 2019.
- V. Mandikas and E. Mathioudakis, "A parallel multigrid solver for incompressible flows on computing architectures with accelerators", *The Journal of Supercomputing - SUPE*, vol. 73 (11), pp. 4931-4956, Springer, 2017.
- E. Mathioudakis, V. Mandikas, G. Kozyrakis, N. Kampanis, and J. Ekaterinaris, "Multigrid cell-centered techniques for high-order incompressible flow numerical solutions", *Aerospace Science and Technology - AESTE*, vol. 64, pp. 85-101, Elsevier, 2017.

- C. Spanakis, E. Mathioudakis, N. Kampanis, M. Tsiknakis and K. Marias, "A Proposed Method for Improving Rigid Registration Robustness", *Int J. of Comp. Science and Information Security*, vol. 14 (5), pp. 1-11, IJCSIS, 2016.
- E. Maroudas, N. Vilanakis, Ch. Antonopoulos, E. Mathioudakis, Y. Saridakis and M. Vavalis., "Schwarz Splitting for the Steady State Problem of Saltwater Intrusion in Coastal Aquifers", *Int J. of Math Methods in Applied Sciences*, (9), pp. 733-739, NAUN, 2015.
- Athanasakis I., Vilanakis N. and Mathioudakis E., "Solving Discontinuous Collocation Equations for a Class of Brain Tumor Models on GPUs", *Lecture Notes in Engineering and Computer Science*, (2217), pp. 529-534, IAENG, 2015.
- Athanasakis I.E., Dokou Z.A., Mathioudakis E.M., P.N. Stratis and Vilanakis N.D., "Combining Stochastic Optimization and Numerical Methods-Software for the Pumping Management of Coastal Aquifers: Case Study of a Rectangular Homogeneous Aquifer", *Int J. of Math Methods in Applied Sciences*, (9), pp. 727-732, NAUN, 2015.
- Vilanakis N, Mathioudakis E, "Parallel iterative solution of the Hermite Collocation equations on GPUs II", *Journal of Physics: Conference Series*, vol. 490, 012097, 2014.
- Charalampaki N, Mathioudakis E, "CPU-GPU computations for MultiGrid techniques coupled with Fourth-Order Compact Discretizations for Isotropic and Anisotropic Poisson problems", *Procs of NumAn2014*, <http://lib.amcl.tuc.gr/handle/triton/70>, 2014.
- Mathioudakis E., Vilanakis N., Papadopoulou E., Saridakis Y., "Parallel iterative solution of the hermite collocation equations on GPUs", *Lecture Notes in Engineering and Computer Science*, vol. 2205, IAENG, pp. 1281-1286, 2013.
- Mandikas V., Mathioudakis E., Papadopoulou E., Kampanis N., "A High order accurate multigrid pressure correction algorithm for incompressible Navier-Stokes equations", *Lecture Notes in Engineering and Computer Science*, vol. 2204, IAENG, pp. 74-79, 2013.
- A. I. Delis and E.N. Mathioudakis, "A Finite Volume method Parallelization for the Simulation of Free Surface Swallow Water Flows", *Maths and Computers in Simulation*, ELSEVIER, **79**(11), pp. 3339-3359, 2009.
- E.N. Mathioudakis and E. P. Papadopoulou, "Grid Computing for the Bi-CGSTAB applied to the solution of the Modified Helmholtz equation", *Int J of Applied Maths and Comp Science*, **4**(3), pp 179-184, WASET, 2007.
- E.N. Mathioudakis, E. P. Papadopoulou and Y. G. Saridakis, "Preconditioning for solving Hermite Collocation by the Bi-CGSTAB", *Trans on Maths*, **7**(5), pp 811-816, WSEAS, 2006.
- E.N. Mathioudakis and E. P. Papadopoulou, "MPI Management of Hermite Collocation computation on a Distributed-Shared Memory system", *Trans on Maths*, **5**(5), pp 520-526, WSEAS, 2006.
- E.N. Mathioudakis, E. P. Papadopoulou and Y. G. Saridakis, "Iterative Solution of Elliptic Collocation Systems on a Cognitive Parallel Computer", *Computers and Maths with Applications*, **48**, pp 951-970, ELSEVIER, 2004.

- E.N. Mathioudakis, E. P. Papadopoulou and Y. G. Saridakis," Bi-CGSTAB for Collocation Equations on Distributed Memory Parallel Architectures ",*Numerical Maths and Advanced Applications – ENUMATH 2001*, pp 957-966,SPRINGER,2001.
- E.N. Mathioudakis, E. Papadopoulou, Y .G. Saridakis, "Mapping Parallel Iterative Algorithms for PDE Computations on a Distributed Memory Computer", *Int J of Parallel, Emergent and Distributed Systems (formerly Parallel Algorithms and Applications)*, **8**, pp. 141-154, Taylor&Francis, 1996.