



## **Panagis N. Vovos**

Assistant Professor

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## **SUMMARY**

Panagis Vovos was born in Athens in 1978. He graduated from the Department of Electrical and Computer Engineering, University of Patras, in 2002. In 2005 he received his PhD from the University of Edinburgh, School of Science and Engineering. In 2009 he completed his postdoctoral studies at the Department of Electrical and Computer Engineering, University of Patras, introducing a new concept in power systems, the "economical use of equipment". From 2007 to 2011 he worked in the Departments of Electrical Engineering at the University of Patras and the Technical Education Institution of Patras under contract. In 2014, he was elected lecturer on the design and management of power grids in the Department of Electrical and Computer Engineering, University of Patras. In 2018 he was promoted to Assistant Professor in the field of sophisticated electricity networks. He is specialized in developing optimization tools for the design and operation of electricity systems. He is also investigating the extension of optimal power flow tools, methods of increasing generation absorption capacity of power systems and plug-n-play smart grid converters.

## **EDUCATION**

### Postgraduate

2007-2008

### **University of Patras, Greece**

Postdoctoral research

*'A combined approach to generation capacity allocation and network planning'*. Funded by the Hellenic State Scholarships Foundation. It describes a novel concept in power system operation: the economic use of equipment. Economic use of equipment guides system operation, so that the cost of equipment wear is considered during the minimization of overall system running cost. To achieve this, a mathematical description of the connection between wear and use of equipment is needed. As a study case, a methodology of expressing wear of cables as a function of their operating point was also presented. A cost is attached to the wear of each cable system, which is augmented to the overall system running cost. The methodology was simulated and applied on the interconnected network of the Ionian Islands in Greece, which demonstrated the impact of the wear cost of cables during economic dispatch. Most of the results of this work are published in a refereed journal paper.

### Postgraduate

2002-2005

### **University of Edinburgh, UK**

PhD in Electrical Power Engineering

*'A combined approach to generation capacity allocation and network planning'*. Funded by a departmental scholarship my PhD thesis describes a novel methodology for the combined planning of generation expansion and network reinforcement. It is the first planning tool that takes into account the impact of new capacity on losses and considers emerging problems from high penetration of DG,

for instance the raise of fault levels. Such a tool is particularly useful for network operators who currently struggle to maintain the level of service under reduced budgets. The flexibility of the method allows them to incorporate their own social (e.g. subsidisation of renewable generation) or technical (e.g. generator voltage control) policies in the planning phase of their assets. Most of the results are either published in refereed journals or presented in international conferences. However, the objective value of this research is confirmed by its role in securing by Professor Bialek a SuperGen 5 grant ‘UK Energy Infrastructure’ worth £463,000.

Undergraduate  
1997-2002

**University of Patras, Greece**

‘Diploma’ and MEng in Electrical and Computer Engineering  
I received an average grade of 8.1/10, which ranked me in the 8<sup>th</sup> position of my graduation class. My dissertation was on ‘*Replacement of Conventional Variable Air Volume Systems with Adjustable Speed Drives on Fans Powered by Induction Machines. Technical and Financial Analysis*’, supervised by Prof. G. Giannakopoulos. Dissertation passed ‘Summa Cum Laude’.

Secondary 1990-97  
1990-1997

In the Panhellenic Examinations of 1997 I scored 19.875/20 in Chemistry, 16.250/20 in Physics, 17.000/20 in Essay writing and 14.250/20 in Mathematics, which granted me a position in the dept. of Electrical Engineering and Computer Technology, University of Patras. In all six years of Lyceum and Gymnaseum I received an honorary award for having an average grade above 18.50/20.

**TEACHING EXPERIENCE**

My teaching experience has been acquired in the Department of Electrical and Computer Engineering, University of Patras, the Department of Electrical Engineering, Higher Technological Educational Institute (H.T.E.I.) of Patras and the School of Engineering and Electronics, University of Edinburgh:

University of Patras

- 2018- Advanced Systems for the Transmission and Distribution of Power
- 2021-2022 Regulation and operation of electricity markets
- 2016- Power System Economy
- 2016- Fundamentals of Power Systems
- 2018- Power System Protection
- 2014-19&2022-23 Power System Analysis
- 2014-2019 Power System Stability and Control
- 2010-2021 Technical Drawing – unification of Mechanical and Electrical Engineering drawing courses into single-semesterial course.
- 2007-2010 Mechanical Engineering Drawing.  
Electrical Engineering Drawing.

### H.T.E.I. of Patras

2009-2010	Electrical Installations.
2007-2010	Power and Industrial Electronics.
2007-2010	Electrical Measurements.

### Edinburgh University

2005-2006	Power Systems.
2003-2006	Power and Machines (tutorials and lab demonstrations).
2004-2005	Supportive tutoring in the general theory of power systems for the MSc class. Designed, run and supported a tutorial on a WEB-based Virtual Power Market, as part of the course 'Network Simulation' (attended by both MSc and MEng classes). Power Systems and Machines (lab demonstrations). Demonstrator of various computer-oriented seminars in the University's Transferable Skills Programme ('More HTML', 'Graphing your data', 'Introduction to Minitab', 'Introduction to writing web-pages', 'UNIX II').
2003-2004	Powerway (lab demonstrator).

### Supervision of doctoral and diploma theses

He is the supervising professor of four PhD candidates and has supervised the preparation of more than 45 diploma theses.

## **PUBLICATIONS**

### Refereed journal papers

- A1. A. A. Bideris-Davos and P. N. Vovos, "Algorithm for Appropriate Design of Hydroelectric Turbines as Replacements for Pressure Reduction Valves in Water Distribution Systems," in *Water*, vol. 15, no. 3: 554, January 2023.
- A2. P. N. Vovos and K. G. Georgakas, "Smart Boilers: grid support services from non-critical loads," in *Journal of Power and Energy Engineering*, vol. 8, no. 12, pp. 23-45, December 2020.
- A3. P. N. Vovos, I. D. Bouloumpasis and K. G. Georgakas, "Assessment indexes for converter P-Q control coupling," in *Energies*, vol. 13, no. 5, pp. 1-17, March 2020.
- A4. I. D. Bouloumpasis, P. N. Vovos and K. G. Georgakas, "Voltage harmonic injection angle optimisation for grid current harmonics using a PV converter," in *IET Power Electronics*, vol. 12, no. 9, pp. 2382-2388, August 2019.
- A5. Hwachang Song and Panagis N. Vovos, "Decision Making on Bus Splitting Locations Using a Modified Fault Current Constrained Optimal Power Flow (FCC-OPF)", *KIEE Journal of Electrical Engineering & Technology*, Vol. 11, No. 1, pp. 76-85, January 2016.

- A6. Panagis. N. Vovos and Konstantinos G. Georgakas, "Multipurpose Power Converter for Non-Grid-Connected Microsystems," *International Journal of Emerging Electric Power Systems*, Vol. 16, No 2, pp. 165–179, April 2015.
- A7. Ioannis D. Bouloumpasis, Panagis N. Vovos, Konstantinos G. Georgakas, Nicholas A. Vovos, "Current Harmonics Compensation in Microgrids Exploiting the Power Electronics Interfaces of Renewable Energy Sources," *Energies* 8, no. 4: 2295-2311, March 2015.
- A8. Manuelito Jr. Del Castillo, Hwachang Song, Panagis N. Vovos, Tae-Sun Kim, Kang-Wook Cho, Ik-Jong Lee, "Varying Load Voltage Magnitude Impacts on Fault Level Constrained Optimal Power Flow", *International Journal of Research in Engineering and Science (IJRES)*, Vol. 2, No 12, pp. 39–43, December 2014.
- A9. Konstantinos G. Georgakas, Panagis N. Vovos and Nicholas A. Vovos, "Harmonic reduction method for a single-phase dc-ac converter without output filter", *IEEE Trans. on Power Electronics*, Vol. 29, pp. 4624-4632 ,September 2014.
- A10. Ioannis D. Bouloumpasis, Panagis N. Vovos, Konstantinos G. Georgakas, and Nicholas A. Vovos, "A Method for Power Conditioning with Harmonic Reduction in Microgrids", *Renewable Energy and Power Quality Journal (RE&PQJ)*, Vol. 10, No. 12, April 2014.
- A11. Panagis N. Vovos, "Economic Dispatch Considering the Cost of Wear of Cables", *IEEE Trans. Power Systems*, Vol. 26, pp. 642-652, May 2011.
- A12. Panagis N. Vovos and Janusz W. Bialek, "A Combinational Mechanism for Generation Capacity and Network Reinforcement Planning", *IEE Trans. Gen. Transm. and Distr.*, Vol. 1, No.2, pp. 303-311, March 2007.
- A13. Panagis N. Vovos, Aristides E. Kiprakis, Gareth P. Harrison and A. Robin Wallace "Centralized and Distributed Voltage Control: Impact on Distributed Generation Penetration", *IEEE Trans. On Power Systems*, Vol. 22, pp. 476-483, February 2007.
- A14. Panagis N. Vovos and Janusz W. Bialek, "Impact of Fault Level Constraints on the Economic Operation of Power Systems", *IEEE Trans. On Power Systems*, Vol. 21, pp. 1600-1607, November 2006.
- A15. Panagis N. Vovos and Janusz W. Bialek, "Optimal Placement of Reactive Power Compensation Banks for the Maximization of New Generation Capacity," *International Journal of Emerging Electric Power Systems*, vol. 4, iss. 1, December 2005.
- A16. Panagis N. Vovos and Janusz W. Bialek, "Direct Incorporation of Fault Level Constraints in Optimal Power Flow as a Tool for Network Capacity Analysis", *IEEE Trans. On Power Systems*, Vol. 20, pp. 2125-2134, November 2005.
- A17. Panagis N. Vovos, Gareth P. Harrison and A. Robin Wallace, "Optimal Power Flow as a Tool for Fault Level Constrained Network Capacity Analysis", *IEEE Trans. Power Systems*, Vol. 20, pp. 734-741, May 2005.

## Refereed Conference papers

- B1. Natalia Zografou and Panagis N. Vovos, “An accelerated decentralized DC OPF for microgrids”, 10<sup>th</sup> Panhellenic Conference of Electrical and Computer Engineering Students, Xanthi (Greece), October 2017.
- B2. Ioannis D. Bouloumpasis, Panagis N. Vovos, Konstantinos G. Georgakas, Nicholas A. Vovos, “Harmonic Cancellation of PV-supplied DC/AC Converter without Stabilizing Input Capacitors”, IFAC and CIGRE/CIRED Workshop on Control of Transmission and Distribution Smart Grids, Prague (Czech Republic), October 2016.
- B3. Christina N. Papadimitriou, Panagis N. Vovos, Konstantinos G. Georgakas, Nicholas A. Vovos, “A Fuzzy Control Scheme for an Isolated Domestic Application Using Fuel Cell System”, 24th Mediterranean Conference on Control and Automation, Athens (Greece), June 2016.
- B4. Ioannis Bouloumpasis, Panagis Vovos, Konstantinos Georgakas, Nicholas Vovos, “Converter for Harmonic Reduction and Power Quality Improvement in Microgrid”, CIGRE Symposium, Athens (Greece), December 2015.
- B5. Panagis N. Vovos and Hwachang C. Song, “Analytical Approach to Large-Scale System Splitting for the Regulation of Fault Levels”, IEEE PES PowerTech, Eindhoven (Holland), June 2015.
- B6. Hwachang C. Song, P. N. Vovos, T.S. Kim, K.W. Cho, “Decision making of bus splitting for reduction fault current level using a novel network reconfiguration algorithm with rerun optimizer”, CIGRE Session ‘14, C2: System operation and control, C2-211, Paris (France), August 2014.
- B7. Panagis N. Vovos, “Nomadic harvesting of wind energy”, 1<sup>st</sup> International Symposium on Energy Challenges and Mechanics (ECM), Aberdeen (UK), July 2014.
- B8. Panagis N. Vovos, Janusz J. Bialek, “Economic system operation considering the cost of wear of transformers,” IEEE International Conference on Probabilistic Methods Applied to Power Systems (PMAPS), Durham (UK), July 2014.
- B9. Ioannis D. Bouloumpasis, Panagis N. Vovos, Konstantinos G. Georgakas and Nicholas A. Vovos, “A Method for Power Conditioning with Harmonic Reduction in Microgrids”, International Conference on Renewable Energies and Power Quality (ICREPQ’14), Cordoba (Spain), April 2014.
- B10. Panagis N. Vovos, Hwachang C. Song, Kang-Wook Cho, “A Network Reconfiguration Algorithm for the Reduction of Expected Fault Currents”, International Smart Grid Conference & Exhibition, Vancouver (Canada), IEEE Power & Energy Society General Meeting, Vancouver (Canada), July 2013.
- B11. Manuelito Del Castillo, Hwachang Song, Panagis Vovos, Tae-Sun Kim, Kang-Wook Cho, Ik-Jong Lee, Jong-Man Cho, “Study on the Varying Load Voltage Magnitude Impacts on Fault Level Constrained Optimal Power Flow”, International Smart Grid Conference & Exhibition, Jeju (S. Korea), July 2013.
- B12. Hwachang C. Song, Manuelito Del Castillo, Panagis N. Vovos, Tae-Sun Kim, Kangwook Cho, Ik-Jong Lee, “Study on Power Network Reconfiguration Using Fault

- Level Constrained Optimal Power Flow”, KIEE Power System Society Spring conference, Jeju (S. Korea), April 2013.
- B13. Eleni S. Vergini, Panagis N. Vovos, Nicholas A. Vovos, “*Development of small-scale wind turbine simulator using fast-prototyping*”, Electrical and Computer Engineering Student Conference, Athens (Greece), April 2013.
- B14. Manuelito Jr. Del Castillo, Hwachang C. Song, Panagis Vovos, Tae-Sun Kim, Kang-Wook Cho, “Development of Fault Level Constrained Optimal Power Flow (FLC-OPF) Using MATPOWER Platform”, KIEE summer conference, Seoul (S. Korea), July 2012.
- B15. Panagis N. Vovos and Nicholas A. Vovos, “Generation expansion planning considering transient stability of the system”, CIGRE Symposium, Athens (Greece), December 2011.
- B16. Panagis N. Vovos and Janusz W. Bialek, “Optimal Power Flow as a Generation Expansion and Network Reinforcement Planning Tool”, IEEE PES General Meeting, Montreal (Canada), June 2006.
- B17. Panagis N. Vovos and Janusz W. Bialek, “Impact of Fault Level Constraints on the Economic Operation of Power Systems”, PowerTech, St. Petersburg (Russia), June 2005.
- B18. Panagis N. Vovos, Aristides E. Kiprakis, Gareth P. Harrison and J. Robert Barrie, “Enhancement Of Network Capacity By Widespread Intelligent Generator Control”, International Conference & Exhibition on Electricity Distribution (CIRED), Turin (Italy), June 2005.
- B19. Panagis N. Vovos, Janusz W. Bialek and Gareth P. Harrison, “Optimal Generation Capacity Allocation and Network Expansion Signaling using OPF”, Proc. 39th Universities Power Engineering Conference, Bristol (UK), September 2004.
- B20. Panagis N. Vovos, Gabriel B. Giannakopoulos, Nicholas A. Vovos, “Operational Response and Cost Evaluation of the Electric Power Consumed by Variable Air Volume Systems”, CSIT, Patras (Greece), September 2002.

### Books

- C1. Panagis N. Vovos and Evaggelos S. Topalis, “Technical Drawing for Electrical Engineers” (in Greek), 2<sup>nd</sup> edition, ISBN 978-960-456-455-2, Thessaloniki, Greece, Ziti Publications 2016.
- C2. Daniel Kirschen and Goran Strbac, “Fundamentals of Power System Economics, 2<sup>nd</sup> edition”, Translated in Greek by Admitos Bideris-Davos and edited by Panagis Vovos, Wiley, 2021.

### **RESEARCH FUNDING**

- 2021-2024                      Coordinator and PI of the Solar-ERA.net project “Modular Control Systems for Maximising Solar Energy Utilisation and Grid Service

	Provisions by Residential PV Systems coupled with Thermal Storage (SUNSETS)", €750,000.
2012-2013	Funding from KPX (Korea Power Exchange). The content of this cooperation is protected by confidentiality agreement.
2010-2011	A power flow analysis, considering several interconnection options of the Southern Aegean Islands and Crete with mainland Greece, funded by EEN Hellas (daughter company of EDF Energies Nouvelles).
2007-2008	Postdoctoral research funded by the Hellenic State Scholarships Foundation.
2002-2005	My PhD research has been instrumental in securing by Professor Bialek a SuperGen 5 grant 'UK Energy Infrastructure' worth £463,000.

## **REVIEWING EXPERIENCE**

Guest Editor of Special Issue "Efficient Generation Capacity Allocation of Electric Power Systems", Energies.

Guest Editor of Special Issue " Applications of High-Efficiency Converters in Smart Grids ", Energies.

He is currently a reviewer for:

- IEEE transactions on Power Systems
- IEEE journal of Engineering
- IEEE transactions on Power Electronics
- IEEE transactions on Power Delivery
- IET Generation, Transmission and Distribution
- ELSEVIER Simulation Modelling Practice and Theory
- ELSEVIER Electric Power Systems Research
- Energies

He is also a reviewer for the international conferences PMAPS (Probabilistic Methods Applied to Power Systems), PSCC (Power Systems Computation Conference), World Renewable Energy Congress (WREC) etc.

For more information, please check reviewer's profile at:

## **AWARDS**

2016	Supervisor of dissertation “Decentralized optimal power flow for microgrids” that won the 1 <sup>st</sup> prize by the Greek IEEE PES chapter.
2002-2005	Departmental scholarship for PhD study, University of Edinburgh.
1997	Scholarship from Technical Educational Institute of Patras.

## **PROFESSIONAL EXPERIENCE**

<b>2022-</b>	Permanent Assistant Professor at the University of Patras with subject "design and operation of advanced electrical energy systems".
<b>2019-2022</b>	Tenured Assistant Professor at the University of Patras with subject "design and operation of advanced electrical energy systems".
<b>2014-2019</b>	Lecturer on Power System Expansion Planning.
<b>2012-2013</b>	Consultant engineer for KPX (Korea Power Exchange).
<b>2010-2011</b>	Consultant engineer for EEN Hellas (daughter company of EDF Energies Nouvelles).
<b>2006-2007</b>	Military service as a Sergeant in the Engineering Corps of the Greek Army, worked on several projects of upgrading the power systems of military camps, organized the Health and Safety Office, and worked as a Safety Technical Consultant in the Brigade of Kos Island.
<b>Summer 2001</b>	Studied the value of superconductive applications for the Energetics/IT department of the distribution network operator Zapadoceska Energetika a.s., Plzen, Czech Republic.
<b>Summer 2000</b>	Involved in the development of a localisation system for the Computer Science dept., University of Mining and Metallurgy, Krakow, Poland.

## **SKILLS PROFILE**

<b>Interpersonal &amp; Management</b>	Support of project and day-to-day work of undergraduate and postgraduate students. Proven team-worker in a professional environment.
<b>Communication</b>	Advanced writing skills in English demonstrated through refereed papers, reviews and PhD thesis (see attached ‘Contribution to Knowledge’). Presentations at international conferences and to colleagues. Native speaker of Greek, fluent in English, basic knowledge of Polish.
<b>Computing</b>	Experience in scientific programming. Design and implementation of MATLAB software for generation capacity allocation and network



reinforcement planning. Development of a WEB-based Virtual Power Market, which considers load variation, outages and planned maintenance. Good knowledge of Assembly, Fortran, C, Java and WEB authoring (PHP and HTML). Proficient in power engineering tools (PSCAD, Powerworld and PSS/E).

## **OTHER INTERESTS**

### **Entertainment & hobbies**

Founding member of Edinburgh's Greek Dance Group (Hellenic Society). Folk dancing. Photography.

### **Family**

Married. Two children.