CURRICULUM VITAE

&

ACTIVITY MEMORANDUM

GEORGIOS T. ANDREOU

Lecturer

Dept. of Electrical and Computer Engineering

Aristotle University of Thessaloniki

Thessaloniki, April 2014

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1. Short CV

1.1. Personal Information

Name	Georgios Andreou
Date and Place of Birth	16/08/1976 Thessaloniki
Current Position	Lecturer in the Dept. of Electrical and Computer Engineering of the Aristotle University of Thessaloniki (DECE-AUTH), in the area of expertise: «Generation, Transmission, and Distribution of Electric Energy».
Work Phone Number	2310 99 6118
Personal Phone Numbers	2310 216733, 6972287835
E-mail	gandreou@auth.gr
Family Status	Married, Father of one child
Military Service	February 2007 – November 2007 (Engineering)

1.2. Studies

2001 – 2006	PhD in DECE-AUTH. Grade: Excellent Dissertation Title: «*Investigation of the characteristics of power distribution networks for broadband powerline communications* » Supervisor: Prof. D. Labridis
1995 – 2000	Diploma in Electrical and Computer Engineering, DECE-AUTH. Grade: 7.79/10 Diploma Thesis Title: «*Study of the capacitive and inductive effects of power transmission lines on adjacent conductors* » Supervisor: Prof. D. Labridis

2. Teaching Activities

2.1. Teaching

W.S.: Winter Semester, S.S.: Spring Semester

2010 – today W.S.	Electrical Power Systems II (DECE-AUTH)
2010 – today W.S.	Special Topics in Electrical Power Systems (DECE-AUTH)
2011 – today S.S.	Introduction to Electrical Power Technology I (DECE-AUTH)
2008 S.S.	Visiting Lecturer: Electrical Power Systems I (DECE-AUTH)
2007 – 2009 W.S.	Visiting Lecturer: Electric Machines & Industrial Automations (Department of Mechanical Engineering, University of Thessaly)
2008 – 2010 S.S.	Visiting Lecturer: Electrotechnics & Electrical Installations (Department of Mechanical Engineering, University of Thessaly)

2.2. Supervision of Diploma Theses

DECE AUTH	From 2010 until today: • 21 Diploma Theses have been concluded under my supervision • 11 Diploma Theses are currently running under my supervision

2.3. Invited Speeches

2012	«*Smart Grids – Opportunities, Prospects and Problems* », during a Technical Chamber of Greece (TCG) Meeting with the topic: «Green ICT Technologies – Prospects and Challenges », Thessaloniki, July 4th 2012.

2.4. Member of PhD Dissertation Committees

PhD Advisory Committees

2010 – today	Member in the Advisory Committees of the following PhD Dissertations: • PhD Dissertation of Mr. K. Sgouras, entitled: «*Intelligent Electrical Power Distribution Systems*», currently running in DECE – AUTH Supervisor: Prof. D. Labridis. • PhD Dissertation of Ms. K. Svarna, entitled: «*Management of Electrical Energy Consumption Information in Smart Grids*», currently running in DECE – AUTH Supervisor: Prof. D. Labridis. • PhD Dissertation of Ms. I. Theodosoglou, entitled: «*Dynamic Electrothermal analysis of Electrical Assemblies*», currently running in DECE – AUTH Supervisor: Asc. Prof. V. Chatziathanasiou. • PhD Dissertation of Ms. K.-N. Malamaki, entitled: «*Decentralized voltage and power quality regulation in LV networks with Renewable Energy Sources*», currently running in DECE – AUTH Supervisor: Asc. Prof. Ch. Dimoulias.

PhD Examination Committees

2010 – today	Member in two (2) PhD Examination Committees, at the Thesis defends of Mr. A. Milioudis and Mr. Ch. Kaloudas.

2.5. Internship Supervision

2011 – today	Within the scope of the DECE-AUTH Internship Programme, which initiated on January 2011: • I have been supervisor for four (4) students who concluded successfully their internship in companies conducting electromechanical projects.

2.6. Other Teaching Experience

Tutoring	*W.S.: Winter Semester, S.S.: Spring Semester*
2002 – 2006 W.S.	Electric Power Systems II (DECE – AUTH) Supervisor: Prof. Dimitris Labridis
2001 – 2006 S.S.	Electric Power Systems III (DECE – AUTH) Supervisor: Prof. Dimitris Labridis
2001 W.S., S.S.	Computers I (Dept. of Mechanology in the School of Technological Applications of the Technological and Educational Institution of Serres)

2002 – 2004 W.S., S.S.	Supervisor: Ass. Prof. A. Pantazopoulos Computer Programming (Dept. of Mechanology in the School of Technological Applications of the Technological and Educational Institution of Serres) Supervisor: Ass. Prof. A. Pantazopoulos

Instructor	
2000 – 2002	Instructor in computer learning courses at Computerkids (FourthR).

3. Participation in Research Projects

3.1. As Project Manager

Greek Research Projects	
01/2012 – 12/2012	**Project:** «Hephaestus – A Non Intrusive Residential Load Monitor» *Description:* Main objective of this project was the design and construction of a hardware assembly for the measurement of the electrical energy consumed by residential LV consumers. The assembly had to cover a set of specifications, such as: measurement of active and reactive power, calculation of consumed energy, sufficient measurement rate for the analysis of the user consuming behaviour, logical cost. *Funding:* Special Account for Research Funds (SARF) AUTH.

3.2. As a Researcher

European Research Projects	
2011 – 2014	**Project:** "CASSANDRA - A multivariate platform for assessing the impact of strategic decisions in electrical power systems" (FP7-ICT-288429) *Description:* Modelling of LV electric energy consumers, in order to provide decision support in the design of Demand Response Programmes. *Funding:* European Commission – FP7.
2004 – 2009	**Project:** "EU-DEEP: The birth of a EUropean Distributed EnErgy Partnership" (FP6, SES6-CT-2003-503516) *Description:* Investigation of the characteristics and limitations regarding the penetration of Renewable Energy Sources in Europe. *Funding:* European Commission – FP6.

Greek Research Projects	
2008 – 2009	**Project:** Electromechanical studies for the GIS 400kV/150kV Aliveri Power Substation. *Description:* Study regarding the mechanical endurance of the equipment of the HV Substation of Aliveri, and respective short-circuit studies. *Funding:* Private Sector.
2005	**Project:** Investigation of the electromagnetic effects of electric power transmission lines on a public school in the municipality of Evosmos, Thessaloniki.

	Description: Magnetic field measurements at the boundaries of a school compound, in order to determine the effects of an adjacent power transmission line. Study according to the international european regulations. *Funding:* Municipality of Evosmos, Thessaloniki.
2004	**Project:** Investigation of the electromagnetic effects of electric power transmission lines on the premises of the American College «Anatolia». *Description:* Magnetic field measurements at the boundaries of a school compound, in order to determine the effects of an adjacent power transmission line. Study according to the international european regulations. *Funding:* Private Sector.
2002 – 2005	**Project:** Reformation of the exisiting programme of undergraduate courses at the DECE, AUTH. *Description:* Creation of online educational material for the courses «Electric Power Systems II» and «Electric Power Systems III» of the DECE, AUTH. *Funding:* Ministry of Education.
2002	**Project:** Investigation of the electromagnetic effects of high voltage electric power transmission lines in the Egnatia Odos toll construction area in Polymylos, Kozani. *Description:* Magnetic field measurements at the boundaries of a toll construction area, in order to determine the effects of an adjacent power transmission line. Study according to the international european regulations. *Funding:* Private Sector.
2001 – 2002	**Project:** Optimal design of energy installations in motorways. *Description:* Design of the ventilation and lighting systems for the Egnatia Odos motorway tunnels. *Funding:* Private Sector.

4. Administration Experience

2010 – 2014	Member of the following committees of DECE-AUTH: • Student Advisor Committee, • Student Matters Committee.

5. Reviewer for Journals

Reviewer for International Scientific Journals	• IEEE Transactions on Power Delivery • IEEE Transactions on Communications • Electric Power Systems Research (Elsevier) • International Journal of Electrical Power & Energy Systems (Elsevier) • Electric Power Components & Systems (Taylor & Francis Group) • Transactions on Emerging Telecommunications Technologies (Wiley)

6. Published Work

6.1. PhD Dissertation

6.1.1. Georgios T. Andreou, «*Investigation of the characteristics of power distribution networks for broadband powerline communications*», Publications Office, AUTH, Thessaloniki 2006.

6.2. Books

6.2.1. Andreou Georgios, Pouliaka Maria, Giannakopoulou Maria, Pantazopoulos Athanasios, «*Introduction to Matlab*», ISBN 960-387-241-5, V. Gkiourdas Publishing, Athens, 2004.

6.3. Papers in Peer Reviewed International Journals

6.3.1. Georgios T. Andreou, Dimitris P. Labridis, "Electrical Parameters of Low Voltage Power Distribution Cables used for Powerline Communications", *IEEE Trans. on Power Delivery*, Vol. 22, No. 2, April 2007, pp. 879-886.

6.3.2. Georgios T. Andreou, Dimitris P. Labridis, "Experimental Evaluation of a Low Voltage Power Distribution Cable Model Based on a Finite Element Approach", *IEEE Trans. on Power Delivery*, Vol. 22, No. 3, July 2007, pp. 1455-1460.

After my election as Lecturer in DECE-AUTH

6.3.3. Aggelos S. Bouhouras, Georgios T. Andreou, Dimitris P. Labridis, "Feasibility Study of the Implementation of A.I. Automation Techniques in Modern Power Distribution Networks", *Electric Power Systems Research*, Vol. 80, Issue 5, May 2010, pp. 495-505.

6.3.4. Aggelos S. Bouhouras, Georgios T. Andreou, Dimitris P. Labridis, Anastasios. G. Bakirtzis, "Selective Automation Upgrade in Distribution Networks Towards a Smarter Grid", *IEEE Transactions on Smart Grid,* Vol. 1, No. 3, December 2010, pp. 278-285.

6.3.5. A.N. Milioudis, G.T. Andreou and D.P. Labridis: "Enhanced Protection Scheme for Smart Grids Using Power Line Communications Techniques—Part I: Detection of High Impedance Fault Occurrence," *IEEE Transactions on Smart Grid,* Vol. 3, No. 4, December 2012, pp. 1621-1630.

6.3.6. A.N. Milioudis, G.T. Andreou and D.P. Labridis: "Enhanced Protection Scheme for Smart Grids Using Power Line Communications Techniques—Part II: Location of High Impedance Fault Position," *IEEE Transactions on Smart Grid,* Vol. 3, No. 4, December 2012, pp. 1631-1640.

6.3.7. I. Papagiannopoulos, V. Chatziathanasiou, L. Exizidis, G.T. Andreou, G. De Mey, B. Wiecek: "Behaviour of the thermal impedance of buried power cables," *International Journal of Electrical Power and Energy Systems*, 44 (2013) 383–387.

6.3.8. A.N. Milioudis, K.N. Syranidis, G.T. Andreou and D.P. Labridis: "Modeling of Medium-Voltage Power-Line Communication Systems Noise Levels," *IEEE Transactions on Power Delivery*, Vol. 28, No. 4, October 2013, pp. 2004‑2013.

In the following tables, the Impact Factors are presented regarding the Journals, in which the aforementioned papers appear, according to Thomson Reuters:

Table 1. Impact Factors of Journals

Journal	**2012 Impact Factor**	**5 Year Impact Factor**
IEEE Transactions on Power Delivery	1.519	1.737
Electric Power Systems Research (Elsevier)	1.694	2.021
International Journal of Electrical Power & Energy Systems	3.432	3.111

The *IEEE Transactions on Smart Grid* Journal started circulating during 2012, and thus it is not included in the Thomson Reuters reports until the last availabe version of year 2013.

6.4. International Peer Reviewed Conferences with Transactions

6.4.1. G.T. Andreou, E.K. Manitsas, D.P. Labridis, P.L. Katsis, F.-N. Pavlidou, P.S. Dokopoulos, "Finite Element Characterization of LV Power Distribution Lines for High Frequency Communication Signals", in *Proc. 2003 of the 7th International Symposium on Power-Line Communications and its Applications*, March 26-28, 2003, Kyoto, Japan, pp. 109-113.

6.4.2. G.T. Andreou, D.P. Labridis, and G. K. Papagiannis, "Modeling of Low Voltage Distribution Cables for Powerline Communications", in *Proc. of the 2003 IEEE Bologna Powertech*, June 23-26, 2003, Bologna, Italy, Page(s):6 pp. Vol.2.

6.4.3. G.K. Papagiannis, D.A. Tsiamitros, G.T. Andreou, D.P. Labridis and P.S. Dokopoulos, "Earth Return Path Impedances of Underground Cables for the multi-layer case – A Finite Element approach", in *Proc. of the 2003 IEEE Bologna PowerTech*, June 23-26, 2003, Bologna, Italy, Page(s):7 pp. Vol.3.

6.4.4. G.T. Andreou, D.P. Labridis, F.A. Apostolou, G.A. Karamanou, M.P. Lachana, "Variation Of Low Voltage Power Cables' Electrical Parameters Due To Current Frequency And Earth Presence", in *Proc. 2004 of the 8th International Symposium on Power-Line Communications and its Applications*, March 31-April 2, Zaragoza, Spain, pp. 33-38.

6.4.5. D.P. Labridis, G.T. Andreou, P.S. Dokopoulos, P.E. Kritikos, "Investigation of the Influence of the Magnetic Field Produced from a Power Transmission Line, in the Polymylos Toll Construction Area", in *Proc. 2004 of the IEE Medpower*, November 14-17, 2004, Lemesos, Cyprus.

6.4.6. G.T. Andreou, D.P. Labridis, "Simulation of a LV Power Distribution Cable as Communication Medium – A Finite Element Approach", in *Proc. of the 2005 IEEE St. Petersburg PowerTech*, June 27-30, 2005, St. Petersburg, Russia.

6.4.7. G.T. Andreou, I. G. Dimoulkas, M. I. Mazneikou, T. A. Papadopoulos, D. P. Labridis, "Performance of Commercially Available Residential PLC Modems", in *Proc. 2007 of the International Symposium on Power Line Communications and its Applications*, March 26-28, 2007, Pisa, Italy.

6.4.8. G.T. Andreou, D.P. Labridis, "Determination of the Topology of Model Residential Power Distribution Circuits Using Neural Networks", in *Proc. of the 2007 IEEE Lausanne PowerTech*, July 1-5, 2007, Lausanne, Switzerland.

6.4.9. Vassilios Chatziathanasiou, Georgios T. Andreou, Olga Gkaitatzi, Ozlem Otuzbir, and Dimitris P. Labridis, "Thermal Analysis of an Installation Fault Concerning a Ripple Control Transformer", in *Proc. of the 9th International Conference on Quantitative Infrared Thermography*, July 2-5, 2008, Krakow, Poland.

6.4.10. A. N. Milioudis, G. T. Andreou, D. P. Labridis, "A Model of an Urban MV Power Distribution Line Based on Finite Element Calculations", in *Proc. of the 2008 Thessaloniki Medpower*, November 2-5, 2008, Thessaloniki, Greece.

6.4.11. V. Chatziathanasiou, G. T. Andreou, and D. P. Labridis, "A Finite Element Approach for the Thermal Analysis of Parallel Routed LV Power Distribution Cables", in *Proc. 2008 of the 2nd International Conference on Modern Power Systems,* November 12-14, 2008, Cluj-Napoca, Romania.

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6.4.12. G. T. Andreou, I. A. Dimitriadou, S. C. Rouseti, and D. P. Labridis, "Investigation of Load Normalization Capabilities within Consumer Social Networks", in *Proc. of the 7th International Conference on the European Energy Market*, June 23-25, 2010, Madrid, Spain.

6.4.13. A. S. Bouhouras, G. T. Andreou and D. P. Labridis, "Reliability Improvement in Distribution Networks by the Upgrade of Critical Switches", in *Proc. of the 7th International Conference on the European Energy Market*, June 23-25, 2010, Madrid, Spain.

6.4.14. A. Antoniadis, G. T. Andreou, V. Chatziathanasiou, and S. Kadi, "Temperature Field Analysis in the Vicinity of Underground Cables – A Finite Element Approach", in *Proc. 2010 of the 3rd International Conference on Modern Power Systems,* May 18-21, 2010, Cluj-Napoca, Romania.

6.4.15. A. N. Milioudis, G. T. Andreou, and D. P. Labridis, "High Impedance Fault Detection Using Power Line Communication Techniques", in *Proc. 2010 of the 45th International Universities' Power Engineering Conference,* August 31 – September 3, 2010, Cardiff, Wales, UK.

6.4.16. A. N. Milioudis, G. T. Andreou, and D. P. Labridis, "High Impedance Fault Evaluation Using Narrowband Power Line Communication Techniques", in *Proc. of the Trondheim Powertech 2011,*June 19-23, 2011, Trondheim, Norway.

6.4.17. A. L. Symeonidis, V.P. Gountis, G. T. Andreou, "A Software Agent Framework for exploiting Demand-side Consumer Social Networks in Power Systems", in Proc. 2011 of the IEEE/WIC/ACM Intelligence Agent Technology Conference, 22-27 August, 2011, Lyon, France.

6.4.18. T.Nikolopoulou, A. Boier, G. T. Andreou, V. Chatziathanasiou, S.Kadi, "Thermal Modeling of a Buried Single Phase Low Voltage Cable", in *Proc. 2011 of the 4th International Conference on Modern Power Systems,* May 17-20, 2011, Cluj-Napoca, Romania.

6.4.19. A.S. Bouhouras, G.T. Andreou, A.N. Milioudis and D.P. Labridis, "Signature of Residential Low Voltage Loads", in *Proc. of the 2012 IEEE International Conference on Industrial Technology (ICIT),*March 19-21, 2012, Athens, Greece.

6.4.20. A.S. Bouhouras, A.N. Milioudis, G.T. Andreou, and D.P. Labridis, "Load Signatures Improvement through the Determination of a Spectral Distribution Coefficient for Load Identification", in *Proc. of the 9th International Conference on the European Energy Market*, May 10-12, 2012, Florence, Italy.

6.4.21. G.T. Andreou, A.L. Symeonidis, C. Diou, P.A. Mitkas, and D.P. Labridis, "A Framework for the Implementation of Large Scale Demand Response", in *Proc. of the IEEE International Conference on Smart Grid Technology, Economics and Policies*, December 3-4, 2012, Nuremberg, Germany.

6.4.22. A.N. Milioudis, G.T. Andreou, V.N. Katsanou, K.I. Sgouras, and D.P. Labridis, "Event Detection for Load Disaggregation in Smart Metering", in *Proc. of the IEEE Innovative Smart Grid Technologies (ISGT) Europe 2013*, October 6-9, 2013, Lyngby, Denmark.

7. Brief Analysis of Scientific Publications

7.1. PhD Dissertation

7.1.1. Georgios T. Andreou, «*Investigation of the characteristics of power distribution networks for broadband powerline communications*», Publications Office, AUTH, Thessaloniki 2006.

The scope of this doctorate dissertation is the study of the characteristics of residential power distribution networks for power line communications. At first a theoretical methodology is presented for the calculation of the electrical parameters of two-conductor circuits versus frequency. Moreover, specific problems which make some of the calculations theoretically impossible are denoted. In addition, calculations based on the Finite Element Method are conducted for the extraction of the series impedances of cable types commonly used in residential power distribution circuits. Both the cables' third conductor and the presence of the earth are taken into account.

Next, a simple model is proposed for the cables of residential power distribution circuits based on the above calculations, as well as on the topology of the circuits. The proposed model is evaluated through measurements conducted in real cable configurations with a network analyzer.

Finally, a novel method is proposed for the determination of the topology of residential power line circuits, based on the usage of appropriate neural networks. The theoretical background of the method is analyzed, and applications based on it are presented.

7.2. Books

7.2.1. Andreou Georgios, Pouliaka Maria, Giannakopoulou Maria, Pantazopoulos Athanasios, «*Introduction to Matlab*», ISBN 960-387-241-5, V. Gkiourdas Publishing, Athens, 2004.

Most complex software packages for engineers fulfill a multitude of functions, more or less elaborate. Matlab is one of these software packages, as its functionality covers a wide range of applications, from simple mathematical calculations to complex simulations. This book comprises material for an introductory course in the Matlab environment. It analyzes its basic mathematical component, and uses a combination of visual educational material with an interactive exercise solving methodology, aiming to help the reader begin learning.

7.3. Papers in Peer Reviewed International Journals

7.3.1. Georgios T. Andreou, Dimitris P. Labridis, "Electrical Parameters of Low Voltage Power Distribution Cables used for Powerline Communications", *IEEE Transactions on Power Delivery*, Vol. 22, No. 2, April 2007, pp. 879-886.

Many models proposed in the literature to describe Low Voltage power distribution networks in consumer premises as communication media require knowledge of the electrical parameters of the cables comprising these networks. These parameters are nevertheless affected by a large number of factors which may vary greatly from case to case, making it thus very difficult to achieve an exact estimation about them. In this work a study of the electrical parameters of two cable types widely used in residential low voltage power distribution networks is presented. Moreover, a finite element approach is used for the verification of the results of the theoretical model concerning the series impedance per unit length of the cable type under study with respect to its normal operational conditions.

7.3.2. Georgios T. Andreou, Dimitris P. Labridis, "Experimental Evaluation of a Low Voltage Power Distribution Cable Model Based on a Finite Element Approach", *IEEE Transactions on Power Delivery*, Vol. 22, No. 3, July 2007, pp. 1455-1460.

In this work, a cable model is presented based on the analysis presented in paper 6.3.1.. Approximations that are made are analyzed and validated. Moreover, an experimental setup is used to validate the cable model, which includes various, both single-path and multipath cable networks in order to achieve generality. Experimental results are analyzed, and theoretical difficulties based on the cables' nature are denoted.

After my election as Lecturer in DECE-AUTH

7.3.3. Aggelos S. Bouhouras, Georgios T. Andreou, Dimitris P. Labridis, "Feasibility Study of the Implementation of A.I. Automation Techniques in Modern Power Distribution Networks", *Electric Power Systems Research*, Vol. 80, Issue 5, May 2010, pp. 495-505.

Contemporary power distribution networks are no longer regarded as passive power system elements. On the contrary, novel control systems are being constantly developed over the last decade, aiming to achieve reliability improvement and operational optimization by means of power loss reduction, prompt fault detection and power restoration etc. A crucial aspect of the systems developed to achieve these goals will inevitably be their ability to integrate new functions without the need for further investment. In this paper, a multi agent system (MAS) initially developed for fault detection and power restoration is studied with respect to these issues. More specifically, a feasibility analysis is conducted regarding the implementation of the MAS on a segment of the underground 20 kV power distribution network of the city of Thessaloniki, Greece. The analysis focuses on the initial investment cost and the payback of the application, as well as on the additional benefits for the power distribution system operator

due to the system reliability improvement. The ability of the MAS to incorporate Loss Reduction algorithms without further investment is also studied, and the respective benefits of the power distribution system operator are analyzed. Moreover, the feasibility analysis is generalized so as to be able to be applied to any power distribution automation implementation with similar attributes.

7.3.4. Aggelos S. Bouhouras, Georgios T. Andreou, Dimitris P. Labridis, Anastasios. G. Bakirtzis, "Selective Automation Upgrade in Distribution Networks Towards a Smarter Grid", *IEEE Transactions on Smart Grid,* Vol. 1, No. 3, December 2010, pp. 278-285.

Research on Smart Grid technologies has been advancing over the last years, producing novel practices concerning mainly the power distribution networks. However, in many countries these networks still operate in their traditional form, without offering the real time operational characteristics which are essential for the utilization of the aforementioned practices. On the other hand, due to the extent of urban power distribution networks, as well as the substantial cost of medium voltage equipment, the full upgrade of these networks is in most cases not a feasible option. In this work, alternative options of selective automation upgrade in power distribution networks are offered, corresponding to the desired operational status of these networks. More specifically, the essential upgrades are analyzed for the implementation of reliability improvement and loss reduction techniques on such a network.

7.3.5. A.N. Milioudis, G.T. Andreou and D.P. Labridis: "Enhanced Protection Scheme for Smart Grids Using Power Line Communications Techniques—Part I: Detection of High Impedance Fault Occurrence," *IEEE Transactions on Smart Grid,* Vol. 3, No. 4, December 2012, pp. 1621-1630.

Occurrence of high impedance faults (HIFs) in rural overhead power distribution networks may cause safety and economic issues for both public and the utility. Such faults may not be detected by the conventional protection schemes, so the development of a more sophisticated method is necessary. The forthcoming evolution of power networks to smart grids creates opportunities for new technologies to be implemented to that purpose. Utilities may transmit data that are necessary for the system operation using specific frequency ranges. A novel method utilizing these is proposed in this work. The monitoring of the network's input impedance in these frequency ranges can be used for detection of HIF occurrence, because such faults impose significant changes in its value. The proposed method is applied to single branch topologies, as well as to an existing topology of a Greek rural distribution system. Significant conclusions are derived in both cases. Moreover, the influence of several parameters, such as fault impedance and location and earth's electromagnetic prop- erties on the method's efficacy is examined. Also, it is shown that the implementation of the proposed method may be drastically simplified by focusing on the monitoring of specific frequencies rather than the entire frequency range under study.

7.3.6. A.N. Milioudis, G.T. Andreou and D.P. Labridis: "Enhanced Protection Scheme for Smart Grids Using Power Line Communications Techniques—Part II: Location of High Impedance Fault Position," *IEEE Transactions on Smart Grid,* Vol. 3, No. 4, December 2012, pp. 1631-1640.

An effective protection scheme against high impedance faults (HIFs) has to efficiently confront the issues of detection and location simultaneously. In Part I of this study the issue of detection is investigated, while in Part II a method that deals with the exact location of HIF position using an installed power line communication (PLC) system is elaborated. This method comprises specific test signal injections into the power grid after a HIF alarm is set. Using impulse responses that are recorded by the PLC devices, the location of the fault may be derived. A flowchart that describes the usage of the complete method for HIF detection and location is presented. The impulse responses that correspond to several fault cases are shown and the methodology that may lead to the fault location is explained. The effect of the fault type and its impedance on the efficacy of the method is highlighted. Finally, the model is applied to a line that is part of the Greek rural distribution system and its validity is tested.

7.3.7. I. Papagiannopoulos, V. Chatziathanasiou, L. Exizidis, G.T. Andreou, G. De Mey, B. Wiecek: "Behaviour of the thermal impedance of buried power cables," *International Journal of Electrical Power and Energy Systems*, 44 (2013) 383–387.

The ampacity of power cables depends heavily on their ability to diffuse their resistive heating to their environment. This ability however depends in turn on the characteristics of the material surrounding the power cable. In this work, the concept of thermal impedance is utilized in order to determine the thermal properties of a power cable buried in earth with respect to the burial depth. To that purpose, a theoretical analysis is conducted concerning the calculation of the thermal impedance for the problem under study. Moreover, an experimental setup is used in order to test the remarks obtained by the theoretical analysis concerning the thermal behaviour of the cable.

7.3.8. A.N. Milioudis, K.N. Syranidis, G.T. Andreou and D.P. Labridis: "Modeling of Medium-Voltage Power-Line Communication Systems Noise Levels," *IEEE Transactions on Power Delivery*, Vol. 28, No. 4, October 2013, pp. 2004‑2013.

The implementation of power-line communication systems requires detailed knowledge of the channel properties, such as transfer function, noise levels, and channel capacity in order to assess the services that can be provided. In this paper, the interference scenario on overhead medium-voltage power distribution lines caused by external electromagnetic (EM) fields is examined by focusing on the noise induced. The external EM fields are considered to be the main source of occurring noise and a novel method capable to calculate the corresponding noise levels is presented. The proposed method is compared to other existing models and its strengths are highlighted. The effect of the induced noise to the overall data capacity of the power-line communication channel is examined. Eventually, the influence of several parameters, such as the magnitude and direction of propagation of the external EM field, network

topology, earth's EM properties, and different levels of emissions suggested by various organizations are investigated.

7.4. International Peer Reveiwed Conferences with Transactions

7.4.1. G.T. Andreou, E.K. Manitsas, D.P. Labridis, P.L. Katsis, F.-N. Pavlidou, P.S. Dokopoulos, "Finite Element Characterization of LV Power Distribution Lines for High Frequency Communication Signals", in *Proc. 2003 of the 7th International Symposium on Power-Line Communications and its Applications*, March 26-28, 2003, Kyoto, Japan, pp. 109-113.

The proper channel modeling is essential for reliable data transmission at high rates over the power grid. This paper presents a finite element approach for the calculation of the electrical parameters needed for the simulation of low voltage distribution cables carrying high frequency communication signals. The results obtained by our approach are validated through measurements performed on various cable types frequently installed in residential power distribution networks.

7.4.2. G.T. Andreou, D.P. Labridis, and G. K. Papagiannis, "Modeling of Low Voltage Distribution Cables for Powerline Communications", in *Proc. of the 2003 IEEE Bologna Powertech*, June 23-26, 2003, Bologna, Italy, Page(s):6 pp. Vol.2.

Scope of this paper is to present results obtained by different procedures applied in the calculation of the electrical parameters for the simulation of low voltage distribution cables carrying high frequency communication signals. The examined procedures originate from methods used in transmission line modeling as well as in electromagnetic field analysis. Simple models of various cable types frequently installed in residential power distribution networks are used for the comparison of the procedures.

7.4.3. G.K. Papagiannis, D.A. Tsiamitros, G.T. Andreou, D.P. Labridis and P.S. Dokopoulos, "Earth Return Path Impedances of Underground Cables for the multi-layer case – A Finite Element approach", in *Proc. of the 2003 IEEE Bologna PowerTech*, June 23-26, 2003, Bologna, Italy, Page(s):7 pp. Vol.3.

The lossy earth return path influences significantly the electrical parameters of underground power cables, especially in cases where transient simulation models are of interest. The use of approximations for the calculation of earth correction terms proves to be inaccurate at high frequencies or low earth resistivities. The infinite integral terms representing the earth influence are high oscillatory in cases of underground cables and therefore difficult to integrate numerically. Scope of this paper is to present and compare results, obtained by a novel numerically stable and efficient integration scheme to those obtained by a Finite Element Method formulation for several single core cable configurations and for homogeneous and multi-layered earth. Significant differences between impedances are recorded, especially for high frequencies and low earth resistivities.

7.4.4. G.T. Andreou, D.P. Labridis, F.A. Apostolou, G.A. Karamanou, M.P. Lachana, "Variation Of Low Voltage Power Cables' Electrical Parameters Due To Current Frequency And Earth Presence", in *Proc. 2004 of the 8th International Symposium on Power-Line Communications and its Applications*, March 31-April 2, Zaragoza, Spain, pp. 33-38.

Many models proposed in the literature to describe Low Voltage power distribution networks in consumer premises as communication media require knowledge of the electrical parameters of the cables comprising these networks. These parameters are nevertheless affected by a large number of factors which may vary greatly from case to case, making it thus very difficult to achieve an exact estimation about them. In this work a finite element approach is used to study the variation of the resistance and inductance per unit length of cables usually installed in the Low Voltage networks of interest. The main parameters under study were current frequency, cable distance from earth and earth resistivity.

7.4.5. D.P. Labridis, G.T. Andreou, P.S. Dokopoulos, P.E. Kritikos, "Investigation of the Influence of the Magnetic Field Produced from a Power Transmission Line, in the Polymylos Toll Construction Area", in *Proc. 2004 of the IEE Medpower*, November 14-17, 2004, Lemesos, Cyprus.

The Electromagnetic Interference caused by power transmission and distribution lines has been an aspect of great interest over the last years, especially in combination with the research done on potential health hazards. International organizations have proposed bylaws that put limits on the value of the generated magnetic field. In this work, the magnetic field created by a 150 kV power transmission line is measured in the Polymylos Toll construction area (a location on the Northern Greece), according to international measurement protocols. The degree of compliance with the recent applicable European regulation is analyzed.

7.4.6. G.T. Andreou, D.P. Labridis, "Simulation of a LV Power Distribution Cable as Communication Medium – A Finite Element Approach", in *Proc. of the 2005 IEEE St. Petersburg PowerTech*, June 27-30, 2005, St. Petersburg, Russia.

In a former paper, information is extracted regarding the series impedance matrices for residential low voltage power cables [6.4.4]. In this paper, the Finite Element Method is used to extract the operational series impedances for the same cables, taking into account the real operationing conditions of these cables. Subsequently, a study is performed regarding the effects of the frequency, the cable distance from earth, and the earth resistivity to the operational electrical parameters of these cables.

7.4.7. G.T. Andreou, I. G. Dimoulkas, M. I. Mazneikou, T. A. Papadopoulos, D. P. Labridis, "Performance of Commercially Available Residential PLC Modems", in *Proc. 2007 of the International Symposium on Power Line Communications and its Applications*, March 26-28, 2007, Pisa, Italy.

The scope of this work is to evaluate the performance of power line modems developed for use in residential communication networks. For this purpose, two sets of commercially available

power line modems based on different specifications are tested in 20 different households representing the most usual residential power distribution networks in Greece. The results show the average throughput achieved in normal operational conditions by the two different modem types, as well as the limitations in their performance. Specific problematic situations are pointed out and explained. This process provides valuable information, concerning the usage of residential power distribution networks for communication purposes.

7.4.8. G.T. Andreou, D.P. Labridis, "Determination of the Topology of Model Residential Power Distribution Circuits Using Neural Networks", in *Proc. of the 2007 IEEE Lausanne PowerTech*, July 1-5, 2007, Lausanne, Switzerland.

The deterministic approach concerning the channel modeling of residential power distribution circuits for broadband communication purposes presupposes the knowledge of the topology of these circuits. In this work, a novel method is proposed concerning the usage of neural networks for the determination of the unknown circuit topologies. Moreover, the first step of this method is presented, regarding the usage of backpropagation neural networks for the determination of the topology of theoretical model residential power distribution circuits. The method is explained, and subsequently implemented in specific example problems.

7.4.9. Vassilios Chatziathanasiou, Georgios T. Andreou, Olga Gkaitatzi, Ozlem Otuzbir, and Dimitris P. Labridis, "Thermal Analysis of an Installation Fault Concerning a Ripple Control Transformer", in *Proc. of the 9th International Conference on Quantitative Infrared Thermography*, July 2-5, 2008, Krakow, Poland.

The Greek Public Power Company utilizes Ripple Control by the use of three single phase infusion current transformers. Recently a problem occurred in one of the transformers, when its feeding cable blew. The cable was replaced with a new one, which again blew after some time. This paper deals with the analysis of the reasons that led to this problem. A theoretical study is presented, along with an infrared thermography depiction of the problematic transformer. Finally, thermal analysis is also used on an experimental setup for the better comprehension of the incident.

7.4.10. A. N. Milioudis, G. T. Andreou, D. P. Labridis, "A Model of an Urban MV Power Distribution Line Based on Finite Element Calculations", in *Proc. of the 2008 Thessaloniki Medpower*, November 2-5, 2008, Thessaloniki, Greece.

Many of the models proposed in the literature regarding Power Line Communications attempt to describe the cables used by their distributed electrical parameters. The thorough study of these cables' characteristics becomes thus essential. In this work, the electrical parameters of two commonly used medium voltage cable types are theoretically calculated based on specific approximations. The theoretical results are subsequently verified by the use of a Finite Element approach.

7.4.11. V. Chatziathanasiou, G. T. Andreou, and D. P. Labridis, "A Finite Element Approach for the Thermal Analysis of Parallel Routed LV Power Distribution Cables", in *Proc. 2008 of the 2nd International Conference on Modern Power Systems,* November 12-14, 2008, Cluj-Napoca, Romania.

In this work, a Finite Element approach was used for the thermal analysis of a real case concerning the current distribution among parallel routed LV power distribution cables in an industrial substation feeder. In this context, the power distribution cable ampacities were used as input in a thermal Finite Element formulation for the determination of the cables' temperatures. The Finite Element formulation was used on both the problematic cable configuration and an optimum cable rearrangement, aiming to evaluate the advantages of the latter solution to the given problem.

After my election as Lecturer in DECE-AUTH

7.4.12. G. T. Andreou, I. A. Dimitriadou, S. C. Rouseti, and D. P. Labridis, "Investigation of Load Normalization Capabilities within Consumer Social Networks", in *Proc. of the 7th International Conference on the European Energy Market*, June 23-25, 2010, Madrid, Spain.

This work investigates the benefits resulting from the coalition of LV customers into Consumer Social Networks. To that purpose, ten different model consumers are studied concerning their daily load curves. These curves have been constructed taking into account ordinary household appliances which present high power consumption levels. Subsequently, the model consumers are considered to form a Social Network, aiming to normalize their overall load curve. In order to achieve this target, a plan of specific actions is produced, such as the time shift of specific loads, as well as the set point adjustment of others. The result of this procedure shows that the normalization of the overall load curve of a Consumer Social Network is possible within satisfactory deviation levels, and may in any case lead to a substantial decrease concerning the maximum aggregated demand of its members.

7.4.13. A. S. Bouhouras, G. T. Andreou and D. P. Labridis, "Reliability Improvement in Distribution Networks by the Upgrade of Critical Switches", in *Proc. of the 7th International Conference on the European Energy Market*, June 23-25, 2010, Madrid, Spain.

This paper presents a systematic method to derive an optimum switching plan for real time management of distribution systems with respect to loss reduction and reliability. This plan is based on the determination of a number of critical switches to be upgraded in order to ensure feasibility. The proposed algorithm provides the set of switches that participate in all reconfigurations for loss reduction under load alterations. Furthermore, for every switch a participating percentage in all possible reconfigurations is assigned in order to prioritize the switches that need to be upgraded. Finally an analysis is implemented for the evaluation of this automation upgrade in reliability improvement. For the test case a real urban distribution

network with real data has been examined. The results indicate that even if automation upgrade is implemented on some critical switches for real time loss reduction, the arising benefits regarding reliability improvement could be significant. Reliability improvement is expressed through the reduction of the well known reliability indices SAIDI, SAIFI, CAIDI and EENS.

7.4.14. A. Antoniadis, G. T. Andreou, V. Chatziathanasiou, and S. Kadi, "Temperature Field Analysis in the Vicinity of Underground Cables – A Finite Element Approach", in *Proc. 2010 of the 3rdInternational Conference on Modern Power Systems,* May 18-21, 2010, Cluj-Napoca, Romania.

In this work, the temperature field in the vicinity of three medium voltage power cables buried in earth is studied concerning their long term operation. The study involves the time dependent simulation of these cables by the use of a finite element approach. The output of the simulation consists of the temperature field in the problem geometry, i.e. the cable arrangement and the ground surrounding it. Since the problem of heat removal aggravates when the cables are in an environment of elevated temperature, the simulations were considered to take place during consecutive summer days. Apart from that, additional simulations were also performed in order to account for special phenomena, such as a number of consecutive days with excessive heat conditions (a usual case scenario in Greece during summer), as well as overloading and short-circuit conditions. In each case, results are presented considering the effect of each phenomenon on the temperature field of both the cable and the ground surrounding it.

7.4.15. A. N. Milioudis, G. T. Andreou, and D. P. Labridis, "High Impedance Fault Detection Using Power Line Communication Techniques", in *Proc. 2010 of the 45th International Universities' Power Engineering Conference,* August 31 – September 3, 2010, Cardiff, Wales, UK.

The detection of high impedance faults has been an important research field for many years. The insignificant increase of the system current in case of such faults makes their detection a difficult task, although at the same time a crucial one for reasons of public safety. In this work, the influence of a high impedance fault on the line's overall input impedance is examined, for frequencies within both the CENELEC A Band and the typical high speed PLC range. The tested line configurations correspond to phase to phase and phase to ground signal injections. Also, the different effects of a high impedance fault according to the exact fault location and the line termination are investigated. Finally, a comparison among the results concerning the two selected frequency bands is conducted, so as to determine the one with the most desirable performance.

7.4.16. A. N. Milioudis, G. T. Andreou, and D. P. Labridis, "High Impedance Fault Evaluation Using Narrowband Power Line Communication Techniques", in *Proc. of the Trondheim Powertech 2011,*June 19-23, 2011, Trondheim, Norway.

This paper is following the work of 6.4.15. Having determined the use of the CENELEC A frequency band for the input impedance monitoring regarding a power distribution network, aiming to detect high impedance faults, this paper extends the study to branched networks. Moreover, parametric analysis is performed with respect to the effect of the electromagnetic properties of the earth, as well as of the exact fault location, on the methodology results.

7.4.17. A. L. Symeonidis, V.P. Gountis, G. T. Andreou, "A Software Agent Framework for exploiting Demand-side Consumer Social Networks in Power Systems", in Proc. 2011 of the IEEE/WIC/ACM Intelligence Agent Technology Conference, 22-27 August, 2011, Lyon, France.

This work aims to introduce the novel concept of Consumer Social Networks (CSNs) as a means to promote demand-side response and raise social awareness towards energy consumption. The authors argue that the formation of such CSNs is expected to increase the electricity consumer market power by enabling them to act in a collective way. To that end, the power system with all its involved actors (Consumers, Producers, Electricity Suppliers, Transmission and Distribution Operators) and their requirements is modeled. EnergyCity is a multi-agent framework designed and developed in order to simulate the power system and explore the potential of the CSN concept. The semantic infrastructure for the formation and analysis of electricity CSNs is discussed, and the basic consumer attributes and CSN functionality are identified. The functionality of EnergyCity is analyzed, and the results of preliminary analysis are discussed.

7.4.18. T.Nikolopoulou, A. Boier, G. T. Andreou, V. Chatziathanasiou, S.Kadi, "Thermal Modeling of a Buried Single Phase Low Voltage Cable", in *Proc. 2011 of the 4th International Conference on Modern Power Systems,* May 17-20, 2011, Cluj-Napoca, Romania.

In this work, an experimental setup is presented, designed to offer temperature measurements for a single phase Low Voltage cable buried in soil. The experimental setup is designed for a sufficient range of amperage levels and thermal boundary conditions (e.g. existence or not of solar radiation), and its aim is to serve as a basis for the development of a respective simulation model. To that purpose, a finite element model has been also developed for the determination of the thermal properties of the cable under study. More specifically, the experimental setup is modeled using a commercial finite element software package. The model is based on a thermal finite element formulation, and it is validated with the measurements acquired from the experimental setup. The successful results of this procedure are presented here.

7.4.19. A.S. Bouhouras, G.T. Andreou, A.N. Milioudis and D.P. Labridis, "Signature of Residential Low Voltage Loads", in *Proc. of the 2012 IEEE International Conference on Industrial Technology (ICIT),*March 19-21, 2012, Athens, Greece.

A survey is presented in this work, regarding the essential measurements for the determination of the operational "signature" of Low Voltage (LV) electrical loads. The concept of load signature is explained, and measurements are analyzed and conducted according to specific criteria that may be used for the automated recognition of the operation of individual loads. To that purpose, LV loads that may be found in a residential installation are initially classified into categories according to their operational characteristics. Furthermore, the notion of load "labeling" is introduced as a fundamental step towards the development of efficient load recognition mechanisms. Moreover, the load recognition criteria are analyzed and classified into the ones that presuppose the existence of direct measurements, and the ones that may be indirectly calculated. Subsequently, the implemented measurement setup is presented, along with a set of measurements regarding specific LV loads, corresponding to the aforementioned load classification. The respective results are analyzed, denoting thus the limitations of the process of using the concept of load signature for the recognition of the loads' individual operation.

7.4.20. A.S. Bouhouras, A.N. Milioudis, G.T. Andreou, and D.P. Labridis, "Load Signatures Improvement through the Determination of a Spectral Distribution Coefficient for Load Identification", in *Proc. of the 9th International Conference on the European Energy Market*, May 10-12, 2012, Florence, Italy.

In this paper a novel and simple methodology for developing distinct load signatures is proposed. The analysis relies on the exhaustive utilization of the information embedded in the harmonic behavior of a load, towards the formulation of an appropriate data form that could describe the behavior of a Low Voltage (LV) load in a unique and representative way. Based only on the current magnitude during one period of the steady state, a special coefficient is formulated under a simple procedure determining the spectral distribution of the current. A load identification algorithm is also developed and presented in order to examine the robustness and effectiveness of the resulting load signatures. The results are very promising since they indicate that uniqueness in load signatures is indeed added by the proposed technique and hence, the improvement of the effectiveness of the signatures could contribute in more efficient Nonintrusive Load Monitoring (NILM) algorithms.

7.4.21. G.T. Andreou, A.L. Symeonidis, C. Diou, P.A. Mitkas, and D.P. Labridis, "A Framework for the Implementation of Large Scale Demand Response", in *Proc. of the IEEE International Conference on Smart Grid Technology, Economics and Policies*, December 3-4, 2012, Nuremberg, Germany.

The rationalization of electrical energy consumption is a constant goal driving research over the last decades. The pursuit of efficient solutions requires the involvement of electrical energy consumers through Demand Response programs. In this study, a framework is presented that

can serve as a tool for designing and simulating Demand Response programs, aiming at energy efficiency through consumer behavioral change. It provides the capability to dynamically model groups of electrical energy consumers with respect to their consumption, as well as their behavior. This framework is currently under development within the scope of the EU funded FP7 project "CASSANDRA – A multivariate platform for assessing the impact of strategic decisions in electrical power systems".

7.4.22. A.N. Milioudis, G.T. Andreou, V.N. Katsanou, K.I. Sgouras, and D.P. Labridis, "Event Detection for Load Disaggregation in Smart Metering", in *Proc. of the IEEE Innovative Smart Grid Technologies (ISGT) Europe 2013*, October 6-9, 2013, Lyngby, Denmark.

One of the targets of smart grids is the decrease of the electrical energy consumption through the efficient network utilization. At the level of a single low voltage consumer, the achievement of such a target requires the detailed knowledge regarding the respective consumption. This paper presents an event detection methodology aiming to decompose overall residential power demand curves into partial curves corresponding to the operation of single electrical loads. This work was concluded within the scope of the EU funded FP7 project "CASSANDRA – A multivariate platform for assessing the impact of strategic decisions in electrical power systems".

8. Citations to Published Work by Other Researchers

The citations presented here have been retrieved by Google Scholar, during the first week of May, 2014. In the end of this section, respective information is provided regarding the number of citations retrieved by Scopus and ISI Web of Science.

8.1. Citations

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Paper 6.4.7: G.T. Andreou, I. G. Dimoulkas, M. I. Mazneikou, T. A. Papadopoulos, D. P. Labridis, "Performance of Commercially Available Residential PLC Modems", in *Proc. 2007 of the International Symposium on Power Line Communications and its Applications*, March 26-28, 2007, Pisa, Italy.

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Paper 6.4.16: A. N. Milioudis, G. T. Andreou, and D. P. Labridis, "High Impedance Fault Evaluation Using Narrowband Power Line Communication Techniques", in *Proc. of the Trondheim Powertech 2011,* June 19-23, 2011, Trondheim, Norway.

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Paper 6.4.20: A.S. Bouhouras, A.N. Milioudis, G.T. Andreou, and D.P. Labridis, "Load Signatures Improvement through the Determination of a Spectral Distribution Coefficient for Load Identification", in in *Proc. of the 9th International Conference on the European Energy Market*, May 10-12, 2012, Florence, Italy.

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8.2. Overall Presentation

The overall citation number according to **Google Scholar**, and without taking into account citations from participants in each paper, is **63**. According to this information, the respective **h-index** value is **6**.

In the follwing table, this information is compared with the respective information retrieved by **Scopus** και **ISI Web of Science**, again without taking into account citations from participants in each paper.

Table 2. Citation comparison among different sources

Source	Citations	h-index
Google Scholar	63	6
Scopus	37	4
ISI Web of Science	18	3