Πανεπιστήμιο Κύπρου
University of Cyprus

School of Engineering
Department of Electrical and Computer Engineering

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Department of Electrical and Computer Engineering

Title: *"PV system models for assessing the power quality behaviour of distribution grids in the presence of high PV penetration levels"*

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Room XOD02 - 016, New Campus – University of Cyprus

Abstract:
In recent years, increasing concerns about climate change and the liberalisation of the energy market have provided the necessary impetus for alternative energy sources. Traditional power networks are designed to operate in a passive and unidirectional way as their main functionality encompasses the transfer of energy from the power stations to the customer, with minimum losses. Increased electricity production from renewable energy sources (RES) coupled with energy efficiency lie at the heart of the ambitious targets set by Europe in its quest to curb greenhouse gas emissions and to reach energy sustainability.
Especially in regions with high solar irradiance, high penetration of photovoltaic (PV) systems is expected to arise in the near future and as the technology becomes more competitive. High penetration of Photovoltaic (PV) systems will definitely have serious consequences on the operation of the electricity grid and further challenges will arise as penetration levels increase. The actual motivation of this work is the aforementioned expected increased penetration of RES and in particular PV and the potential problems associated with the high uncontrolled deployment of these technologies.
Therefore this work focuses on the accurate modelling of PV systems in order to assess their transient behaviour during environmental and load changes and proposes universal-simplified methods of characterizing PV systems. Weather effects as well as voltage variations or disturbances caused by the electricity grid itself are investigated in terms of their dynamic behaviour. Power quality (PQ) indices for the real time operation/performance of PV systems are assessed and presented. Additionally, as an extension of the above work, accurate distribution grid modelling is undertaken in order to gain the ability of creating a more advanced tool for further studies on electricity grids.
The ultimate aim/goal of this PhD work is to improve the potential of installing high quantities of PV systems by proposing a generic and accurate model of PV generation for use in power quality and fault/unbalance studies. The development of appropriate models will improve the understanding of problems relative to distributed generation and lead to the development of appropriate solutions.

Biography:
Minas Patsalides received his BSc degree from the University of Cyprus and is currently a PhD candidate at the Department of Electrical and Computer Engineering, University of Cyprus. Minas has obtained the top mark of his year from the Department of Electrical and Computer Engineering, University of Cyprus. His research interests include measurements and analysis of power quality events, renewable sources of energy and applications of ArcGIS Systems in the evaluation of measurements of electromagnetic fields. Minas has great expertise in the fields of PV technology, power electronics, power systems modelling, smart meters, new inverter standards, surge protection devices, power saver unit evaluation, monitoring as well as the implementation of storage in conjunction with PV grid connected systems.