”Power Quality in Power Electronics Empowered Transmission Networks”

Abstract: The future power/energy systems will be characterised by blurred boundaries between transmission and distribution system, by mix of wide range of electricity generating technologies (conventional hydro, thermal, nuclear and power electronic interfaced stochastic and intermittent renewable generation), responsive and highly flexible, typically power electronics interfaced, demand and storage with significant temporal and spatial uncertainty, proliferation of power electronics (HVDC, FACTS devices and new types of load devices) and significantly higher reliance on the use of measurement data including global (Wide Area Monitoring) signals for system identification, characterization and control and Information and Communication Technology embedded within the power system network and its components. One of the main attributes of the above systems is increased uncertainties associated with system operation and modelling. There are generally two forms of uncertainty associated with any system modelling and analysis: i) Aleatory uncertainty (irreducible uncertainty and variability) which represents the inherent random behaviour of a system commonly modelled by probabilistic distribution functions and propagated by probability based approaches (sampling, analytical methods, probabilistic chaos expansion); ii) Epistemic uncertainty (reducible uncertainty and state of knowledge uncertainty) which models the uncertainty in parameter estimation due to data shortages or model simplification. The other prominent feature is high proliferation of Power Electronics based devices at all levels across the electricity supply chain. This presentation focuses on one aspect of operation of such systems, namely power quality. It discusses assessment of power quality in power systems with large proliferation of and reliance on power electronics interfaced devices, transmission networks in particular, and presents methodology (and results) developed as part of the work on EU H2020 Project MIGRATE. It also discusses options for global assessment of power quality using single “all inclusive index” considering that different buses in the network may be exposed to different level of different power quality disturbances/phenomena.

Biography of the presenter: Jovica V Milanovic received Dipl.Ing. and M.Sc. degrees from the University of Belgrade, Yugoslavia, Ph.D. degree from the University of Newcastle, Australia, and D.Sc. degree from The University of Manchester, UK. Prior to joining The University of Manchester, UK, in 1998, he worked with “Energoproject”, Engineering and Consulting Co. and the University of Belgrade in Yugoslavia, and the Universities of Newcastle and Tasmania in Australia.

Currently, he is a Professor of Electrical Power Engineering, Deputy Head of School and Director of External Affairs in the School of Electrical and Electronic Engineering at The University of Manchester, UK , Visiting Professor at the University of Novi Sad and the University of Belgrade, Serbia and Conjoint Professor at the University of Newcastle, Australia.

He was chairman of 4 international conferences , editor or member of editorial/technical boards of 50+ international journals and conferences, research project assessor for numerous international government research funding councils, member of 9 (convenor of 3) past or current IEEE/CIGRE/CIRED WG and consultant to, or member of advisory boards for several international companies. Professor Milanovic published over 450 research papers and reports, gave numerous key note speeches at international conferences and presented over 120 courses/tutorials and lectures to industry and academia around the world.

Professor Milanovic is a Chartered Engineer in the UK, Foreign member of the Serbian Academy of Engineering Sciences, FIET, FIEEE, Distinguished IEEE PES Lecturer and currently serves on IEEE PES Governing Board as Regional Representative for Europe, Middle East and Africa and as Member of the IEEE PES Fellows Committee.