Learn about **Real-Time Simulation** and Hardware-In-the-Loop testing of modern power grid and energy conversion systems, its requirements, applications and latest advancements in industrial, research and academic applications.

TUTORIAL

Real-Time Simulation of Modern Power Systems

Role, Requirements, Applications and Case Studies

Tutorial Title:	**Real-Time Simulation of Modern Power Systems: Role, Requirements, Applications and Case Studies**
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Targeted Audience:	Professors; Researchers (Master's and PhD Students); Electric Power System and Power Electronics Engineers; Technical Managers
Duration:	3 Hours

ABSTRACT

With the increasing complexity of modern power systems (integration of renewable energy resources, distributed generation, smart metering and control, interconnected national grids, etc.), and with the staggering advancement in digital computing processors in the recent few decades, real-time simulation (RTS) has emerged as one of the key tools in the design, testing and optimization of modern and future power grids. The GCC power grid is at that milestone in its development where it started and will continue its modernization by: integrating variable energy sources and renewable resources in particular, relying on smart monitoring, protection, and control, and increasing its inter-state connections.

However, compared with the traditional grid, the modern grid has special real-time simulation requirements due to three main characteristics: its extensive use of high switching power electronics, its increased complexity, and its distributed nature; all these characteristics result in special challenges in load, speed and accuracy requirements requested from real-time simulators.

The tutorial explains real-time simulation of modern electric systems, covering power generation, transmission, and distribution, renewable energy systems, smart grids, renewable energy systems, distributed energy systems, energy power conversion and modern transportation powertrains. It describes the role of real-time simulators in building reliable and efficient energy systems, explains the requirements of simulating modern electromechanical systems in real-time hardware-in-the-loop setup, and discusses the latest software and hardware technologies and tools, with various sample applications and case studies in both research and industrial projects.

BIOGRAPHY

Simon Abourida is the Middle East Business Development Manager at OPAL-RT Technologies. He has a Master's degree in electrical engineering from Ecole Polytechnique de Montreal (1994), and 20 years of experience in real-time simulation of electric systems. At OPAL-RT, he led several projects of real-time hardware-in-the loop simulation in the fields of power systems, renewable energy systems, hybrid vehicles, motor drives and power electronics, and has organized multiple tutorials and seminars. He is involved in project management, technology analysis, market research, business development and sales, in the area of real-time simulation and hardware-in-the-loop testing of dynamic systems mainly power systems, power electronics and drives.

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About OPAL-RT

OPAL-RT is world leader in providing cutting-edge Real-Time Simulators for companies, research institutes and universities worldwide, to help them achieve better research and product quality, through the use of real-time simulation, rapid control prototyping and hardware-in-the-loop testing, for the design, test and optimization of control and protection systems used in power grids, power electronics, motor drives, transportation systems, and various dynamic systems.

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