Webinar by the IEEE Ottawa Section, Instrumentation & Measurement Society Chapter (IMS), IEEE Power and Energy Society Ottawa Chapter (PES), Reliability Society and Power Electronics Society Joint Chapter (RS/PELS), Communications Society, Consumer Electronics Society, and Broadcast Technology Society Joint Chapter (ComSoc/ CESoc/BTS), and IEEE Ottawa Educational Activities (EA)

The IEEE Ottawa Section is inviting all interested IEEE members and nonmembers to a webinar

Josephson Arbitrary Waveform Synthesizer as a Quantum Standard of Voltage and Current Harmonics

By

Dr. Dimitrios Georgakopoulos, Senior Research Scientist
National Measurement Institute, Sydney, Australia

DATE: Thursday, July 09, 2020.
TIME: Webinar: 6:30 p.m. – 7:30 p.m.
PLACE: Online. Free registration required at https://events.vtools.ieee.org/m/233847

Abstract

Josephson arbitrary waveform synthesizers (JAWS) are becoming a viable technology for national metrology institutes and industry to establish quantum standards of direct and alternating voltage. At the National Measurement Institute of Australia (NMIA) we have extended the application of the JAWS to provide a standard of both the magnitude and the phase of harmonics in a distorted waveform. Harmonic analysis is critical in a number of industrial applications such as electric power systems, power electronics, characterization of systems and materials and acoustics and vibration. At present, in the calibrations of power analyzers, the traceability of the magnitude of the harmonics is based on ac-dc transfer measurements. However, there is a gap in the traceability of the phase of the harmonics relative to the fundamental. The NMIA calibration system uses a JAWS chip from the National Institute of Standards and Technology (NIST), USA, a precision inductive voltage divider and a set of current shunts designed and manufactured by NMIA. For distorted waveforms with harmonic magnitudes from 5% to 40% of the fundamental, the calibration system can measure odd harmonics up to the 39th with magnitude uncertainties better than 0.001 % of the fundamental for voltage (from 0.01 V to 240 V) and current (from 0.005 A to 20 A) waveforms. The best phase uncertainties range from 0.001° to 0.010° ($k = 2.0$), depending on the harmonic number and harmonic magnitude. We anticipate that the ability of the JAWS to generate distorted waveforms with the lowest possible uncertainty in the magnitude, and phase spectra will make it a unique tool for low-frequency spectrum analysis.

Speaker's Bio

Dimitrios Georgakopoulos (IEEE AM'11–M'12–SM'12) was born in Athens, Greece, in 1972. He received his B.Eng. degree in electrical engineering from the Technological Educational Institution of Piraeus, Egaleo, Greece, in 1996; his M.Sc. degree in electronic instrumentation systems from the University of Manchester, Manchester, UK, in 1999; and Ph.D. in electrical engineering and electronics from the University of Manchester Institute of Science and Technology, Manchester, UK, in 2002.

From 2002 to 2007, he worked as a research scientist at the National Physical Laboratory, UK. In 2007, he joined the National Measurement Institute, Australia, as a research scientist, where he has been working on the development of quantum voltage standards and low frequency electromagnetic compatibility (EMC) standards.

Dr Georgakopoulos is an Associate Editor of the *IEEE Transactions on Instrumentation and Measurement*, member of the IEEE IMS Measurements in Power Systems Committee (TC-39), member of the NATA Accreditation Advisory Committee for Calibrations, and member of the American Association for the Advancement of Science (AAAS), USA.

Admission: Free. Registration required at https://events.vtools.ieee.org/m/233847.
For any additional information, please contact: branislav@ieee.org or ajit.pardasani@ieee.org.