

2023 6th Asia Conference on Energy and Electrical Engineering (ACEEE 2023)
Chengdu, China, 21-23 July 2023

Keynote Speaker



Prof. Gianfranco Chicco (IEEE Fellow)
Politecnico di Torino, Italy

Gianfranco Chicco holds a Ph.D. in Electrotechnics Engineering and is a Full Professor of Electrical Energy Systems at Politecnico di Torino (POLITO), Italy. He is a Fellow of the IEEE and the Vice-Chair of the IEEE Italy Section. He received the title of Doctor Honoris Causa from the Universities Politehnica of Bucharest and Technical University “Gheorghe Asachi” of Iasi (Romania) in 2017 and 2018, respectively. He is listed in the “Top 2% Scientists” ranking prepared by Stanford University. He is the Scientific Responsible of the research group on Power and Energy Systems at POLITO, and the Responsible of the Torino unit of the Italian Consortium ENSIEL.

He is the Editor-in-Chief of Sustainable Energy Grids and Networks, and a Subject Editor of Energy. He was the Conference Chair of WESC 2006, IEEE ISGT Europe 2017, and UPEC 2020, and is the General co-Chair of IEEE Eurocon 2023. Within POLITO, he participated in various European projects. Within ENSIEL, he was the Scientific Coordinator for the European project H2020 MIGRATE and participated in the European projects FP7 eHighway2050 and H2020 OSMOSE.

Title: Combined Indicators of Waveform Distortion and Unbalance for Power Quality Studies

Abstract:

The three-phase systems generally operate under unbalanced conditions and with distorted voltage and current waveforms. The common indicators of harmonic distortion used in power quality analysis and in the standards consider the individual waveforms. The unbalance is commonly defined by taking into account only the positive, negative and zero-sequence components at fundamental frequency.

This presentation addresses a general framework developed to analyse three-phase systems with neutral in conditions of unbalance and harmonic distortion. In this framework, the Symmetrical Component-Based (SCB) method provides the distinction between the balance, unbalance and distortion components of the phase currents and of the neutral current. The distortion component is further partitioned into a balanced distortion and unbalanced distortion component. From these components, two global indicators are defined, namely, the Total Phase current Distortion (TPD, which extends the concept of total harmonic distortion to unbalanced systems) and the Total Phase current Unbalance (TPU, which extends the concept of unbalance to systems with distorted currents). In the same framework, a set of indicators is also formulated to identify the contribution of the triplen harmonics. Finally, a conventional representation is presented to consider balance, unbalance and distortion components for interharmonics, provided that specific consistency conditions are verified in the representation of the frequency bands gathered from the network analysers. Cases taken from real measurements are presented to show the application of the concepts exposed.