



Introductory notes for the Acta IMEKO special section on the “22nd Symposium on the Measurement of Electrical Quantities” and the “20th Workshop on ADC/DAC Modeling and Testing”

Alexandru Salceanu¹, Vilmos Pálfi²

¹ “Gheorghe Asachi” Technical University of Iasi, Iasi, Romania

² Budapest University of Technology and Economics, Budapest, Hungary

Section: Editorial

Citation: Alexandru Salceanu, Vilmos Pálfi, Introductory notes for the Acta IMEKO Special Section on the “22nd Symposium on Measurement of Electrical Quantities” and the “20th Workshop on ADC/DAC Modelling and Testing”, Acta IMEKO, vol. 7, no. 4, article 1, December 2018, identifier: IMEKO-ACTA-07 (2018)-04-01

Editor: Dušan Agrež, University of Ljubljana, Slovenia

Received December 20, 2018; **In final form** December 20, 2018; **Published** December 2018

Copyright: © 2018 IMEKO. This is an open-access article distributed under the terms of the Creative Commons Attribution 3.0 License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

Corresponding author: Alexandru Salceanu, e-mail: asalcean@tuiasi.ro

Distinguished Readers,

This finalizing issue of Acta IMEKO’s volume 7 presented here is based on the 22nd International Symposium and 20th Workshop on ADC/DAC held in Iasi, Romania in September 2017 by IMEKO Technical Committee Number 4, (Measurement of Electrical Quantities). This joint event was organized and hosted with the aim of supporting world development through electrical and electronic measurements and of bringing to the debate among the global community of specialists the latest results achieved by professors and researchers from 17 countries with significant experience and results achieved within the realm of the IMEKO Confederation. Out of the 109 presented papers, the section chairmen and members of the Scientific Committee rigorously selected the 20 most suitable papers according to the standards, requirements, and reputation of Acta IMEKO Journal. After much hard work, in the company of a very demanding panel of reviewers but with a constructive approach, the best 12 papers were finally polished and consequently accepted for this issue. A common feature of the articles presented here is their innovative approach and technically and financially affordable solutions.

In this vein, the paper presented by Sandu et al. describes the benefits of and principles underlying measuring defects handling metrics in automotive programs and organizations that have adopted Agile software development, presenting the Iteration Containment Effectiveness, Program Increment Containment Effectiveness, and Defect Debt Trend metrics.

The acquired advantages are demonstrated by a detailed real-life application of how to measure the classic Phase Containment Effectiveness metric.

Vremera et al. propose a new improved design of a dual-channel broadband twin micro-calorimeter based on the design of hardware and new suitable algorithms, consequently allowing for the self-calibration of the system without the dismounting/mounting operations between measurement cycles. The main benefits include its shorter measurement time, maintenance of at least the usual accuracy of micro-calorimeters, improvement in thermal noise rejection, and perfect correlation of the measured data series with the calculated data.

Möwius et al. present an introspection into the universe of permanent magnets from the perspective of the newest techniques and methods that allow their properties to be measured after final processing, often even in situ, within the sub-assemblies in which they actually operate. The synthetic analysis here-presented balances the advantages and limitations of the considered methods, related to the achievable accuracy level.

The aim of the paper submitted by Bongiorno et al. is to deal with the variability in railway track-to-ground conductance measurements, mainly due to the connection of the negative terminal of the power supply to a grounding electrode instead of the behind section and due to the location chosen for the voltage terminal. A simulation model including unideal soil is

proposed and used to maintain appropriate correspondence between realistic simulation and accurate measurements.

De Zanet et al. focus on the fast methods of blood impedance determination used in the pre-analytical stage of blood sample analysis, where the cause of most laboratory errors is found. A fast and mobile device is a desirable task for any blood analysis, and electrical impedance measurement has considerable applicative potential. A biosensor to separate different blood components, to identify hemolysis in serum, to evaluate blood quality, and to promptly quantify hematocrit levels is proposed.

“Andante” is the smart walker intended to monitor and analyze human gait in real time, developed by Viegas et al. The system makes use of e-textile electrodes to sense the user's heart rate, load cells to measure the forces applied on the walker legs, and an inertial measurement unit to sense motion and orientation. All this data is sent via Bluetooth to a local host and can be stored after processing to reconstitute the individual's initial walking style, in other words, the gait legacy. The proposed design might be easily integrated into any existing walker on the market.

Tavčar et al. detail with conviction the implementation and testing of an acoustic thermometer with a single waveguide, presenting its small size, improved sensitivity, and maintenance of an acceptable common sound path. Solutions for treating some weaknesses (low return signals and possible coincidences of the return signals) are also proposed. A standard deviation of 0.050 °C with 66 independent readings per second could be described as an astonishing result.

The study of Riess et al. concludes that while heating an electric car during winter time, the energy savings achieved by using a bioethanol fuel-operated heater instead of an electrical heater is up to 30 %. The design, actual installation in the car, measurements, and test drives are presented in detail, mainly supporting the much-desired range extension.

The experience of Santobono-Pausilipon Hospital regarding technology-based rehabilitation pathways is shared with our readers by Iuppariello et al. Children with motion impairments (like gait disorders following obesity and neurological diseases) could benefit from specialized assistance. Physiological parameters (such as gait or balance) might be registered and modelled, robotics and virtual reality systems providing alternatives to conventional therapy. Two such complementary and innovative approaches are described in detail.

Castello et al., starting from the knowledge of the ongoing conditions of an electric grid, have implemented a new transmission logic for the transfer of data between phasor measurement units and phasor data concentrators. The innovative approach proposed here is to increase the measurement reporting rate only when the electric system changes from a steady-state condition to a dynamic one (which might be a defect or unwanted transition). The danger of losing the important characteristics of the surveyed transition is mitigated by sending to the concentrator, after it is revealed, supplementary data related to the pre-trigger time interval in a burst of data packets, which are relevant and providing information about its previous evolution.

A characterization of the close magnetic field produced by various home appliances and a possible cause-effect relationship with the drawn current is investigated by Ursache et al. An ingenious experimental setup allows for the ease of determination of the correspondence between current consumption and the generated magnetic field in the near

environment. Forty-seven home appliances were tested, covering almost all the entire spectrum, and they were divided into two main categories: 26 with an electric motor in normal functioning and 21 without. As the authors anticipated, no linear dependence between the current consumption and the magnetic field generated by the household appliances from both classes was found. Plausible and reasoned explanations for apparent non-compliance with the Biot-Savart law are provided.

A prolonged and rigorous activity of monitoring eight photovoltaic plants over seven consecutive years provided interesting results that are displayed and processed here by Carullo et al. The obtained data is relevant mainly due to the appropriate selection of the plants that were included in the monitoring: units with different applied technologies, with fixed or mobile panels, in various environments. The multi-channel data acquisition system, which measures both the environmental-specific parameters and the supplied electricity in real time, is efficiently used to determine the rate of degradation of each plant that is being monitored. The authors drew conclusions about choosing the most effective solutions for photovoltaic plants, in terms of costs, lifetime, as well as the statistical weather characteristics of the environment in which they are located.

We are deeply honored to have acted as Guest Editors for this innovative and challenging issue of Acta IMEKO. The release presented here is the result of the tireless efforts of a large but homogenous team, integrating authors, reviewers, copyeditors, layout editors, and, last but not least, the new Editor in Chief, Prof. Dušan Agrež, who provided outstanding support during the whole process. We felt that this quasi-large team is entirely devoted to this wonderful ascendant project known as Acta IMEKO. Our greatest joy is that together we have managed to bring to our readers worldwide a considerable number of scientific articles of undeniably new added value, which are rigorously substantiated, accessible to a wide range of specialists, and have a high practical applicability potential.

Alexandru Salceanu

Vilmos Pálfi

Guest Editors