Cycle seminars

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April 9, 2018
Seminar Room, h. 14:30 – 18:30
Polo scientifico-tecnologico Fabio Ferrari – via Sommarive 9 - Trento

**Topic 1: Impedance spectroscopy: from simple ohmmeters to 3D-tomography**
Lecture covers measurement solutions, instrumentation and applications, including:
- historical notes,
- synthesis of the intelligent excitation signals;
- "lock-in" analog and/or digital signal processing of the dynamic response signals (DFT and alternatives);
- examples of implementation of measurement solutions in various instruments and applications (bio-impedance, electro-mechanical and other impedances);
- contactless eddy current measurement: methods and applications;
- electrical impedance tomography (EIT) - a future in the impedance spectroscopy?

**Topic 2: Eddy current measurements for characterization of materials and tissues**
Eddy current (EC) measurements, in the simplest case using the measurement coil “above” the object under test and impedance measurement device, can characterize various structure (like metals, e.g. a 1€ coin), and bio-objects (like inductive monitoring of cardio-respiratory activities of the patient).
Questions covered are: introduction to EC measurements; historical notes, multi-frequency measurement of depth profiles of objects; various single-, dual- and multiple-coil setups and probes; analytical and FEM-forward and reverse modelling of EC; various -to characterize metals, composites, bio- and medical applications; instrumentation aspects: impedance and inductive measurement devices suitable for EC; challenges of magnetic-induction-tomography (MIT).

**Biosketch:** Olev Märtens has born in Tallinn, Estonia, 1960. He has an engineering diploma of electronics (CUM LAUDE) from 1983, PhD from 2000, both degrees from Tallinn University of Technology (TTU). He has experience in the R&D of electronics: engineering of precise AC instrumentation (1980-s) at the Design Office of the Tallinn Radio Factory RET, in SMEs (1990-s) and from 2000 being senior- and lead researcher and now as professor at Thomas Johann Seebeck Department of Electronics, TTU. He has participated in several EU and national projects. He is author on tens of technical papers and inventions and practical solutions of wide range of electronic in the fields of signal and image processing, test&measurement (T&M) & instrumentation. One interest is R&D of impedance based solutions and applications, incl the eddy current based measurements. He is a member of the IEEE and it’s Instrumentation and Measurement Society from 1999 and of IEEE Signal Processing Society from 2017. He has participated in the Texas Instrument’s European University Program from 1990-s, promoting the DSP-based technologies for T&M. CV at ETIS: https://www.etis.ee/Portal/Persons/Display/1fb20a79-bc8f-4b8d-b432-d31209cfee4b?lang=ENG