

Short Note

JANUSZ MROCZKA – CORRESPONDING MEMBER OF POLISH ACADEMY OF SCIENCES

On October 14, 2010, Janusz Mroczka received the nomination for the Corresponding Member of Polish Academy of Sciences. Although measurement is a principal research tool of empirical sciences, during the 60-year history of the Academy its membership was granted only exceptionally to people whose scientific career had been entirely bound up with metrology. Thus, the event of October 14 is of special importance for the Polish measurement community.

Janusz Mroczka was born on April 27, 1952 in the town of Dębica (Poland). He received his M.Sc. degree with honours in 1976, the Ph.D. degree – in 1980, and the D.Sc. – in 1991; all from Wrocław University of Technology, all in the domain of measurement science and technology. In 1996 the President of the Republic of Poland awarded him the title of Professor. His whole academic career has been closely connected with Wrocław University of Technology where is employed for 34 years. Currently, he is Full Professor at the Faculty of Electronics, acting Head of the Chair of Electronic and Photonic Metrology, which he founded in 1998 – after a five-year directorship of the Institute of Electrical Metrology.

Janusz Mroczka's research interests are focused on experimentation and observation methodology, design of algorithms for solving inverse problems, mathematical modelling of physical fields, intelligent measuring devices and systems, spectral and polarization analysis of scattering radiation, application of optical imaging in measurement, multi-sensor data fusion, and application of time-frequency methods in measurement data processing. Despite apparent diversity, his contribution to those domains is deeply consistent if the class of studied problems is concerned. Its methodological value consists in a holistic approach and strong philosophical background – on the one hand – and application-related background – on the other. Even a superficial overview of Janusz Mroczka's research activities enables one to notice that – in parallel to highly theoretical issues – practical problems related to the application of measurement methods in monitoring of the natural environment or industrial processes appear; that – in parallel to hardware issues – purely mathematical problems are considered. All those diverse elements are integrated by an original cognitive approach based on the transformation of abstract physical models – described using concepts of matter, energy and time – into experimentally verifiable metrological models expressed in terms of information theory. That approach consists in appropriate association of an object under study with its physical, mathematical and metrological models – the models interrelated by feedbacks representative of the procedures for their verification by means of some external criteria. The models of measurement objects and of measurement tools, resulting from the cognitive process, are used for estimation of measurands on the basis of raw measurement data – of course after their inversion, since measurement consists in identification of causes on the basis of effects. Thus, the methods for solving inverse problems constitute an important part of Janusz Mroczka's research, especially in two application areas: measurements of particle size and biomedical measurement systems. These problems, because of their strong numerical ill-conditioning, belong to the most difficult computational challenges which require of their researchers to meet exceptionally high requirements concerning mathematical culture, literacy and skills.



Janusz Mroczka's contribution to the domain of measurement science and technology comprises 275 publications (cf. www.bg.pwr.wroc.pl) – among them 43 papers in renowned international journals and three volumes (2008, 2009, 2010) entitled *Problems of Electronic and Photonic Metrology*, a series of books initiated and edited by him. His advising activity is not less impressive: under his guidance 16 young researchers prepared their Ph.D. theses and obtained Ph.D. degrees, 10 others are about to reach this goal. His critical productivity is not less important: he has refereed 33 D.Sc. theses, 9 Ph.D. theses and 21 candidatures for the professor's title.

Janusz Mroczka's teaching activities have been always closely related to the measurement science and technology. He developed and delivered for years such lectures as *Fundamentals of Metrology*, *Physical Fundamentals of Sensors*, *Sensors and Transducers*, *Selected Topics of Optoelectronics*, *Methods of Artificial Intelligence in Measurement Instrumentation*, *Impedance and Optical Tomography*, *Intelligent Building*, *Intelligent Car*, *Intelligent Applications of Sensors and Control Systems*. Under his tutorship, 150 students prepared their B.Sc. or M.Sc. theses and obtained the corresponding degrees.

Both research and teaching activities of the Chair headed by Janusz Mroczka, have an important international dimension due to the network of collaboration including Institut Universitaire des Systèmes Thermiques Industriels (Marseille, France), Laboratoire d'Énergétique des Systèmes et Procédés, Institut National des Sciences Appliquées de Rouen (Rouen, France), Department of Biomedical Engineering, University of Boston (Boston, USA), Department of Engineering and Product Design, University of Central Lancashire (Preston, Wielka Brytania).

Janusz Mroczka's academic achievements have been recognised on many occasions, in particular by entrusting him with important duties in professional associations. He has been a permanent member of The International Society for Optical Engineering (SPIE) since 1992, and a member of International Technical Working Group on Penetrating Radiation since 1994. He has been also a member of The Committee on Metrology and Scientific Instrumentation, Polish Academy of Sciences; he used to be its Vice-Chairman in 2001–2007, and has been chairing it since 2007. He served as a member of the Section of Metrology, State Committee for Scientific Research, during 12 terms of office, and used to be its chairman during 6 terms. His outstanding research contributions were many times awarded; he received, in particular, a prestigious award of Division IV (Technical Sciences) of the Polish Academy of Sciences (1993) and a professors-dedicated scholarship of Foundation of Polish Science (2005).

Already today, despite his relatively young age, Janusz Mroczka may be considered the founder of a scientific school of world-wide importance. At the same time, he is an exceptional man of personal qualities, such as creativity, diligence, reliability, persistence, culture and organisational efficiency, kindness and determination, optimism and cheerfulness. He is married to Ewa (nee Nowak); he has three children (Wojciech, Justyna and Rafał). His principal leisure interests are gardening and mountaineering.

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