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2021 ARA Excellence

2021 ARA Lifetime Achievement Award: Prof. Habil. Dumitru Todoroi, PhD

Dumitru Todoroi is a Professor in the Department of Informatics and Information Management, Faculty of Information Technologies and Economic Statistics, Academy of Economic Studies of Moldova, Chisinau, Republic of Moldova. He is the President of the "AESM Seniors" Association, Director of the Economic Research Center of AESM, President of the "XXI Century Societal Information Systems " Scientific Seminar, President of the Non-Governmental Organization "Information Environ-ment", Member of the Moldova Computer Science Society, Chairman of the CIS Special Interest Group ADAPTABLE COMPUTING and ARA Regional Director for Republic of Moldova. His lifetime achievements include numerous professional accomplishments along with activities to promote science and the Romanian intellectual elite all over the word.

2021 ARA Excellence in Science Award: Prof. Ruxandra Botez, PhD

Ruxandra Botez is a Full Professor, École de technologie supérieure, University of Quebec, Head of the Laboratory of Applied Research in Active Controls, Avionics and AeroServoElasticity LARCASE, Canada Research Chair Holder Tier 1 in Aircraft Modeling and Simulation Technologies and Editor-in-Chief INCAS Bulletin.

Since the beginning of her academic career in 1998, as project leader, she has made highly innovative research science contributions in multidisciplinary areas of aircraft, rotorcraft and unmanned aerial systems (UAS) design, modeling and simulation. Original algorithms were developed for existing aircraft models, which were or will be implemented on

new aircraft, in collaboration with various aerospace companies and research institutes. These unique algorithms were experimentally validated using flight and wind tunnel tests.

Some of these innovative research achievements in the Aerospace Engineering Field are: 'The development of aircraft aero-servo-elasticity modeling algorithms for the F/A-18 fighter aircraft in collaboration with NASA, and for the Canadian CF-18 fighter and the Bombardier Challenger CL-604, that have been validated with flutter flight and wind tunnel testing', 'Morphing wing and winglet controllers to provide optimized low fuel-consumption designs for the Bombardier CRJ-700 Regional Jet, Cessna Citation X business jet and UAS-S4 unmanned aerial vehicle', 'The development of the FDerivatives code for aircraft stability analysis, validated on the Hawker 800 XP business jet, and on the Rockwell-Messerschmitt Bölkow Blohm X-31 experimental jet fighter within the NATO AVT-161', 'The highest certified level D flight simulator model for the Bell-427 helicopter', 'UAS-S4 and UAS-S45 flight simulator model development based on flight tests and geometrical data', 'Aircraft flight trajectories optimization algorithms and their validation on the Flight Management Systems (FMS's) of A-300, L-1011 and SSJ100 aircraft' with the aim to reduce fuel consumption and green gas emissions in collaboration with CMC Electronics, 'Aero-propulsive model development for the Cessna Citation X' in collaboration with CAE Inc., 'Generic in-house engine model development', and many other algorithms.

These large-scale projects took place between 2003 and 2020 and they were funded by major Canadian aerospace consortiums, such as the Consortium of Aerospace Research and Innovation in Quebec (CRIAQ), Green Aviation Research & Development Network Business Led Network of Centers of Excellence in Canada (GARDN-BL NCE), Smart Affordable Green Efficient Aircraft (SA2Ge) and by the Natural Sciences and Engineering Research Council of Canada (NSERC), as well as by international major aerospace companies and research institutes in Canada, such as Bombardier, Thales, Bell Helicopter Textron, CMC Electronics, NRC, and in Italy by CIRA and Alenia Aeronautica. Other joint projects took place under my academic leadership in Canada with FLIR Systems, GlobVision, Presagis, Tristar Multicopters, and with research institutes in other countries, such as NASA (Canada), DLR (Germany), FOI (Germany) and INCAS (Romania), and companies, such as Eurocopter and TAROM (in Romania). Prof. Botez has been appointed the Canadian technical member of 5 NATO Working Groups of Applied Vehicle Technologies AVTs during 2007-2012.

All above exceptional research methodologies and algorithms were developed with the aim to reduce green gas, including CO_2 emissions and fuel consumption in Canada and worldwide, as climate change studies are needed; a minimum reduction of 2% in greenhouse emissions was obtained, which lead to the advancement of Green Aircraft Technologies, that is strongly related to sustainable practice and environmental performance. As Canada Research Chair Tier 1 (Senior) Holder in Aircraft Modeling and Simulation Technologies since 2011, that was renewed until 2025 – which is a high recognition of Canadian professors, Prof. Botez research is concentrated on the design and optimization of best fuel and green gas consumption reduction

methodologies in aircraft modeling and simulation and their validation with experimental (wind tunnel and flight tests) data.

Prof. Botez has founded the Laboratory of Applied Research in Active Controls, Avionics and AeroServoElasticity LARCASE in 2003, that is functioning, since then, under her leadership; a high number of more than 18 PhD students, 80 Master's students (projects and theses) and 260 Internship students graduated mainly under her supervision. A number of 161 archival original journal articles, 300 conference papers and 7 invited book chapters, including one book were published, and 49 invited speaker presentations were given. More than 40 awards were obtained by Prof. Botez and her LARCASE team and more than 100 media articles were written on research methodologies and results.

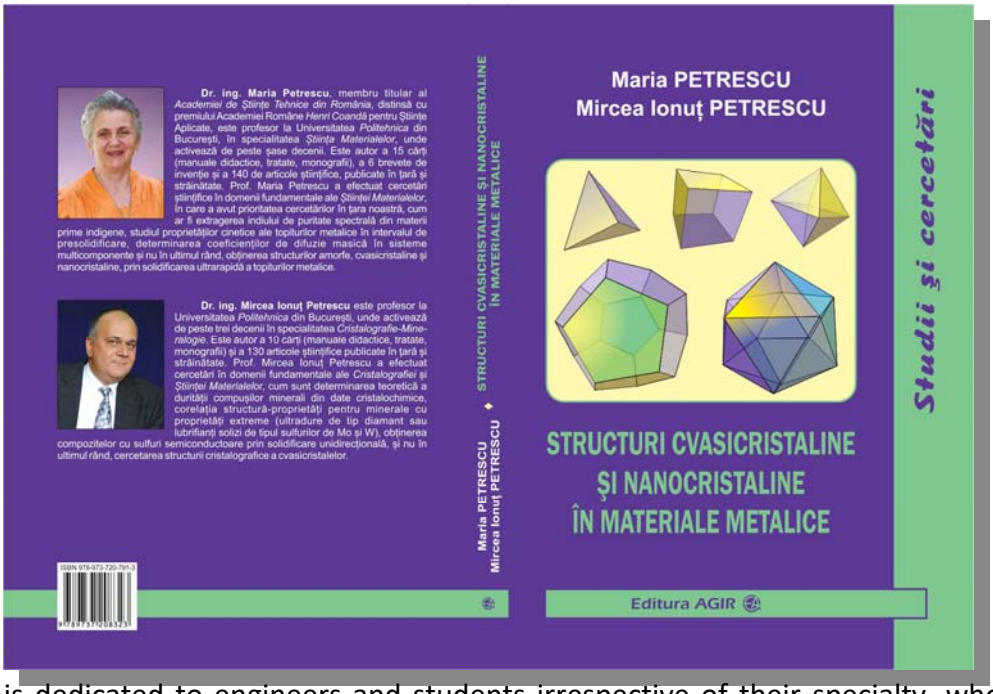
2021 ARA Book Award:

Title: **Quasicrystalline and Nanocrystalline Structures in Metallic Materials**

Published by **Editura AGIR**

Authors: **Prof. Maria Petrescu, Prof. Mircea Ionut Petrescu**

Univeristy POLITEHNICA Bucharest, Romania

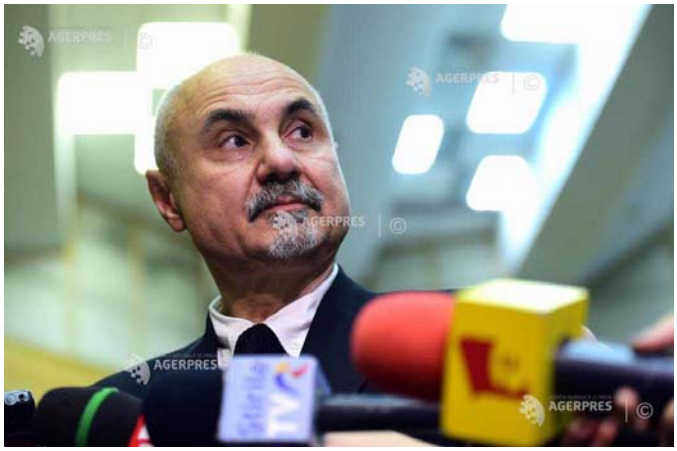


This book is dedicated to engineers and students irrespective of their specialty, who wish to gain scientific insight into the causes of the amazing properties of quasicrystaline and bulk nanocrystalline metallic materials. These advanced materials have either a quasicrystalline atomic structure devoid of spatial periodicity as in usual crystals, or a nanocrystalline structure consisting of crystal grains that may be as small as to comprise only a few thousand atoms. The book also aims to attract specialists in Materials Science and Engineering towards the research of engineered advanced materials.

As the book is mainly intended to clarify the internal structure of quasicrystalline and bulk nanostructured metallic materials, the reader will find in the introductory chapters the basic knowledge on Crystallography, X-ray diffraction, Electron and Neutron diffraction, High resolution electron microscopy. Such knowledge was considered necessary to help the reader understand how the special structure of these advanced materials is revealed through these modern instrumental methods. The book gives examples of how to determine the material structure using these modern methods for both quasicrystalline and nanocrystalline materials, and a not too sophisticated mathematical apparatus in the interpretation of the experimental data.

Since engineers are mainly interested in properties and innovative potential for practical applications, the book also aims at disclosing the ways in which new and unexpected properties arise from the special structure of quasicrystalline and nanocrystalline metallic materials. As these properties depend to a large extent upon the way of fabrication, the reader will find information on the most important ways of producing nanocrystalline and bulk nanostructured metallic materials at an industrial scale, such as rapid solidification by melt spinning, mechanical alloying followed by powder compaction and severe plastic deformation. It is worth mentioning that both laying the basic principles of severe plastic deformation and the discovery of quasicrystals are scientific achievements that have been awarded the Nobel prize.

2021 ARA Excellence in Innovation Award: Prof. Habil. Augustin Semenescu, PhD



Augustin V. Semenescu is a professor at the University POLITEHNICA of Bucharest.

Professor Semenescu applied the results the biophysical and biochemical research work to solve practical problems and won more than 300 Gold Medals for his inventions and innovation. His team has been studied how to synthesize, process and design advanced materials in repairing and healing bone damages, including medical implant such as used in cranioplasty. Prof. Semenescu has in his portfolio over 100 international ISI articles, 26 national ISI articles, 74 CNCIS articles, 116 ISI conferences, 3 books published by international publishing house, 32 books published by national publishing houses, 53 national and international patents of invention, he led 24 European projects as project manager and has over 450 Gold Medals, Trophies and Diplomas awarded in the International Inventions Shows. In November 2021, Professor Semenescu received the OPERA OMNIA award from the Romanian Academy of Technical Sciences for 35 years of innovation.