

Special Issue Honoring Professor George Z. Voyiadjis: Multi-physical Solutions for Harsh Environments: Computations and Experiments



In March 2016, to honor the seminal contributions of George in microstructure plasticity and instability and as a part of the celebration of his 70th birthday, Hanyang University in Seoul, South Korea, hosted an International Symposium on “Multi-Physical Solutions for Harsh Environments: Computations and Experiments.” It was chaired by Taehyo Park and Xi Chen with this dedicated special issue in the

ASME Journal of Engineering Materials and Technology (JEMT). The event spanned 2 days and was attended by researchers from the U.S., Europe, and Asia, including University Professors and Researchers from National Labs and Industries. Many of the technical papers associated with the symposium are included in this Special Issue.

George Z. Voyiadjis celebrated his 70th birthday on December 15th, 2016. This Special Issue is dedicated to him with deep admiration and affection, by his many friends and colleagues around the world.

George was born on December 15, 1946 in Cairo, Egypt, the younger son of Greek Cypriot parents. He obtained his B.Sc. in Civil Engineering in 1969 from the Ain Shams University with First Degree Honors on top of his class. He went on to pursue a M.Sc. in Civil Engineering in 1970 from the California Institute of Technology. He obtained his D.Eng.Sc. in Engineering Mechanics in 1973 from the Columbia University by working with Maciej P. Bieniek. His dissertation was “Large Elasto-Plastic Deformations of Solids.”

He is the Boyd Professor at the Louisiana State University, in the Department of Civil and Environmental Engineering. This is the highest professorial rank awarded by the Louisiana State University System. He is also the holder of the Freepport-MacMoRan Endowed Chair in Engineering. He joined the faculty of Louisiana State University in 1980. Since 2012 he serves as the Director of the Louisiana State University Center for GeoInformatics (LSU C4G).¹

Voyiadjis is a Foreign Member of both the Polish Academy of Sciences, Division IV (Technical Sciences) and the National Academy of Engineering of Korea. He is the recipient of the 2008 Nathan M. Newmark Medal of the American Society of Civil Engineers and the 2012 Khan International Medal for outstanding life-long contribution to the field of plasticity. He was also the recipient of the medal for his significant contribution to

Continuum Damage Mechanics, presented to him during the Second International Conference on Damage Mechanics (ICDM2), Troyes, France, July 2015. This is sponsored by the *International Journal of Damage Mechanics* and is held every 3 years.

He is currently a Distinguished Member of the American Society of Civil Engineers, Fellow of the American Society of Mechanical Engineers, the Society of Engineering Science, the American Academy of Mechanics, the Engineering Mechanics Institute of ASCE, and Associate Fellow of the American Institute of Aeronautics and Astronautics. He was on the Board of Governors of the Engineering Mechanics Institute of the American Society of Civil Engineers and Past President of the Board of Directors of the Society of Engineering Science. He is currently the Chair of the Executive Committee of the Materials Division (MD) of the American Society of Mechanical Engineers. Dr. Voyiadjis is the Founding Chief Editor of the *Journal of Nanomechanics and Micromechanics* of the ASCE and is on the Editorial Board of numerous engineering journals. He was also selected by the Korea Science and Engineering Foundation (KOSEF) as one of the only two World Class University foreign scholars in the area of civil and architectural engineering to work on nanofusion in civil engineering. This is a multimillion research grant.

George’s primary research interest is in plasticity and damage mechanics of metals, metal matrix composites, polymers, and ceramics with emphasis on the theoretical modeling, numerical simulation of material behavior, and experimental correlation. Research activities of particular interest encompass macromechanical and micromechanical constitutive modeling, experimental procedures for quantification of crack densities, inelastic behavior, thermal effects, interfaces, damage, failure, fracture, impact, and numerical modeling. He has extensively worked in size effects in nanosize metallic samples.

He performed his research on developing numerical models that aim at simulating the damage and dynamic failure response of advanced engineering materials and structures under high-speed impact loading conditions. This work will guide the development of design criteria and fabrication processes of high-performance materials and structures under severe loading conditions. Emphasis is placed on survivability area that aims to develop and field a contingency armor that is thin and lightweight, but with a very high level of an overpressure protection system that provides low penetration depths. The formation of cracks and voids in the adiabatic shear bands, which are the precursors to fracture, are mainly investigated.

He has two patents, over 290 refereed journal articles, and 18 books (11 as editor) to his credit. He gave over 370 presentations as plenary, keynote, and invited speaker as well as other talks.

¹<http://c4gnet.lsu.edu/c4g/>

Over 56 graduate students (31 Ph.D.) completed their degrees under his direction. He has also supervised numerous postdoctoral associates. Voyiadjis has been extremely successful in securing more than \$20.0 million in research funds as a principal investigator/investigator from the National Science Foundation, the Department of Defense, the Air Force Office of Scientific Research, the Department of Transportation, and major companies such as IBM and Martin Marietta.

He has been invited to give plenary presentations and keynote lectures in many countries around the world. He has also been invited as guest editor in numerous volumes of the *Journal of Computer Methods in Applied Mechanics and Engineering*, *International Journal of Plasticity*, *Journal of Engineering Mechanics* of the ASCE, and *Journal of Mechanics of Materials*. These Special Issues focus in the areas of damage mechanics, structures, fracture mechanics, localization, and bridging of length scales.

George is a keen sports fan. He was a 200 m sprinter in the Ain Shams University and participated in varsity sports. He has been known for playing soccer at semiprofessional levels for many years overseas and in Baton Rouge, LA, leaving behind many of his younger friends. He also played soccer in Dhahran, Saudi Arabia, in the team of the University of Petroleum in Minerals (currently, the King Fahd University of Petroleum and Minerals). They won several championships over the years. In Baton Rouge, LA, he later played and coached the open men Spartan team and led them to three consecutive championships for the city of Baton Rouge. His team was undefeated for three consecutive years.

George was always fascinated by the two quotes of Alexander the Great: I am indebted to my father for living, but to my teacher for living well, and there is nothing impossible to him who will

try. His wife, Christina, and his daughter and son, Elena and Andrew, enjoyed joining him for academic meetings.

George's work has been a source of guidance and inspiration for many of us, through the development of research areas to which he has contributed so significantly over the years. Those of us who have had the good fortune to know him, either as students or colleagues, are full of admiration and respect for the gentleman and scholar that he is. The authors of the papers contained in the issue include many of George's students and collaborators as well as others associated with him through his nearly 40 years of active career in Modeling Material Behavior at Multiple Scales. We are grateful to them for their enthusiastic participation, which will make this issue a lasting tribute to George. This project would not have been possible without the continued support and advice of Mohammed Zikry, Editor of JEMT.

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