

## סמינר - SEMINAR

הנדך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתקיים ביום ב' 12.10.2020  
(כ"ד בתשרי תשפ"א), בשעה 14:30 באמצעות הזום :  
<https://technion.zoom.us/j/94496583505>

**מרצה:**

**Dr. Charalabos C. Doumanidis**

Distinguished Professor & Founding Dean  
College of Engineering & Computer Science  
Vin University – Hanoi, Vietnam

**על הנושא:**

### **Chaotic Processing for Fractal Structures: Modeling of Mechanical Alloying for Nanoheater Particulates**

The seminar will be given in English

**להלן תקציר ההרצאה:**

Unlike deterministic processing of Euclidean product geometries “by design” at discrete dimensional scales, chaotic processing yields stochastic fractal morphologies with continuous scaling and potentially optimal transport properties. This presentation illustrates the salient underlying issues in modeling and controlling the chaotic process-fractal relationship in the processing example of ball milling for reactive nanoheaters, such as Ni-Al particulates releasing exothermic heat upon ignition. A modeling framework is based on Brownian-like impactor kinematics, warped ellipsoidal domain primitives and elastic-inelastic material transformations for friction and plasticity leading to particle coalescence and fragmentation, and Green’s function imaging for thermal conduction and diffusion during the process. This leads to a computational formulation calibrated experimentally by ball milling of foil sandwiches, and validated in terms of predicted fractal microstructure and particulate size/shape distribution dynamics. This model is used as a real-time observer for in-process control of fractal dimension using temperature feedback and adaptation. The methodology is generalized for processing of nano-composites, bioscaffolds and other nature-synergistic humanitarian applications.

**Bio:**

Haris Doumanidis has his Diploma from the Aristotelian Univ. of Thessaloniki (1983), his MS from Northwestern University (1985), and PhD from MIT (1988) in Mechanical Engineering, followed by a Postdoc appointment at the Laboratory for Manufacturing & Productivity. He has been on the faculty at Tufts University, MIT, University of Cyprus, University of Nevada Reno, Khalifa University and Nazarbayev University, served in the R&D of Hellenic Airforce, Axcelis Technologies, Honda Research Institute, as founding director of the NSF Nanomanufacturing Program, as well as a consultant for the automation, optoelectronics, biomedical, aviation and automotive industry. His work addresses modeling and control of dynamic geometry in thermomechanical processing including welding, ultrasonic rapid manufacturing, laser coating, annealing and cutting. He is a recipient of the Marie Curie Chair of Excellence by the European Commission, the ASME Blackall Award, the Presidential Faculty Fellow Award by the White House (President William J. Clinton), the NSF Young Investigator and the Research Initiation Award as well as several grants from the EU, NSF, SME, Honda R&D Americas etc. He has supervised ten Doctoral and thirty-six Masters students, creditable for four best paper awards and seven startup companies, and mentors several young investigators in the US, Europe, Middle East, Central and SE Asia.

**מארח:** פרופ' מיכאל שפירא

בברכה,

פרופ' נ"א אח"י סאס  
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