Seminar on higher order theory of micropolar rods, plates and shells

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Dates and Venue 10 July 2017, from 14:30 to 15:30, Sala Ferrari, DIMEAS

The MUL^2 group in cooperation with AIDAA Torino and the FULLCOMP project is pleased to announce a seminar on higher order theory of micropolar rods, plated and shells. This talk focuses on structural models for thin-walled structures in micro and nano scale when taking into account micropolar couple stress and rotation effects.

Abstract

New models for micropolar curved rods, plates and shells have been developed. We start from general equations of linear micropolar elasticity using a special curvilinear system of coordinates related to the middle line of the rod and special hypothesis based on assumptions that take into account the fact that the rods and shells are thin. Proposed high order theory is based on the expansion of the equations of the theory of elasticity into Fourier series in terms of Legendre polynomials. First stress and strain tensors, vectors of displacements and rotation and body forces have been expanded into Fourier series in terms of Legendre polynomials with respect to a thickness coordinate. Thereby all equations of elasticity including Hooke's law have been transformed to the corresponding equations for Fourier coefficients. Then in the same way as in the theory of elasticity, system of differential equations in term of displacements and boundary conditions for Fourier coefficients have been developed. The obtained equations can be used to calculate stress-strain and to model thin walled structures in micro and nano scale when taking into account micropolar couple stress and rotation effects.

Executive Summary of Dr. Zozulya

Education

- MsD in Civil Engineering, Kharkov State Technical University, Ukraine, Specialization: Structures, Bridges and Tunnels
- MsD in Mathematics, Kharkov State University, Ukraine, Specialization: Applied Mathematics. Numerical Methods
- PhD in Mechanical Engineering, Mechanical Engineering Institute of the Academy of Science of Ukraine, Specialization: Dynamic and Strength of Machines and Apparatus
- ScD in Mathematical Physics, Institute of Mechanics of the Academy of Science of Ukraine, Specialization: Solid Mechanics

Work experience

- 1978 - 1998 Structural Mechanics Department, Kharkov State Technical University, Ukraine. Researcher, Senior Researcher, Associate Professor, Professor, Head of Department.

- 1998 - Currently Research Center of the State Yucatan, Mexico, Materials Department. Professor, Investigador Titular C (Professor-Researcher)

Research Interest

- Theory of Plates and Shells
- Micro and Nano Mechanics
- Computer Simulation of MEMS/NEMS
- Fracture Mechanics of Materials
- FEM and BEM