Analysis and design of composite structures

Summary

The position is planned for structural analysis and design optimization with advanced materials and structures with main attention on composite structures. The study includes development of methodology for analysis and design of particular practical engineering structures. One application foreseen is an analysis and design optimization of solar panels, also wider class of glass structures and composite laminates since the photovoltaics is rapidly growing renewable energy sector as an alternative to regular fossil fuel powered electricity generation.

Research field:	Mechanical engineering
Supervisors:	Prof. Dr. Jüri Majak
	Kristo Karjust
Availability:	This position is available.
Offered by:	School of Engineering
	Department of Mechanical and Industrial Engineering
Application deadline:	Applications are accepted between September 01, 2020 00:00 and October 02, 2020 23:59 (Europe/Zurich)

Description

Focus of the study is on numerical analysis, however, depending on particular application the experimental study is included (nondestructive and destructive tests for determining the stiffness and strength properties, vibration analysis, buckling analysis, etc.). Based on work group long time experience in area of Artificial Intelligence, utilization of AI tools like artificial neural network, global optimization algorithms have been foreseen. Development and utilization of powerful AI tools allow to analysis and design complex engineering structures involving geometrical and physical nonlinearity, mixed integer variables, discrete variables, local extremes, etc. As real world engineering problems include multiple objectives (maximum strength and stiffness, minimum cost) the extra attention is paid to development and adaption of multicriteria optimization strategies, methods and techniques.

Responsibilities and tasks:

- Experimental study
  Nondestructive and destructive tests for determining the stiffness and strength properties of the materials, structures and its components, vibration analysis, buckling analysis. Planned as team work.
- Numerical analysis
  Development and application of simulation models for structural analysis of engineering structures (particular methods used depend on problems considered). Planned as team work.
- Design optimization
  Development, adaption and application of optimization methods and techniques for design of engineering structures

Qualifications:

- General/basic knowledge in area of numerical analysis of structures, mechanics of composite materials
- MsC in area of engineering / mathematics / physics

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