

ADMISSION TO DOCTORAL STUDIES

Session September 2025

Field of doctoral studies: Mechanical Engineering

Doctoral supervisor: Prof. dr. eng. Simona Lache

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: Multi-objective topological optimization methods for hybrid structures
Contents / Main aspects to be considered Development of topological optimization algorithms for hybrid (multi-material) structures with the possibility of defining multiple objectives.
Recommended bibliography: <ol style="list-style-type: none"> 1. G. I. N. Rozvany, 2007, A critical review of established methods of structural topology optimization, Struct Multidisc Optim, https://10.1007/s00158-007-0217-0. 2. Philipp Junker, Klaus Hackl, 2015, A variational growth approach to topology optimization, Struct Multidisc Optim 52:293–304, https://10.1007/s00158-015-1241-0. 3. S. Ivvan Valdez Salvador Botello, Miguel A. Ochoa, José L. Marroquín Victor Cardoso, 2017, Topology Optimization Benchmarks in 2D: Results for Minimum Compliance and Minimum Volume in Planar Stress Problems, Arch Computat Methods Eng 24:803–839, https://10.1007/s11831-016-9190-3. 4. Osvaldo M. Querin, et. al., 2017, Topology design methods for structural optimization, 2017, Elsevier Academic Press, ISBN: 978-0-08-100916-1. 5. Ibhadode, Osezua, et. al., 2023, Topology optimization for metal additive manufacturing: current trends, challenges, and future outlook, https://doi.org/10.1080/17452759.2023.2181192.
<input checked="" type="checkbox"/> Scientific Doctorate (full-time only) <input type="checkbox"/> Professional Doctorate (full-time or part-time)
<input checked="" type="checkbox"/> without tuition fee (state budget funded) <input type="checkbox"/> with tuition fee or with funding from other sources than the state budget

TOPIC 2: Multi-stable cellular structures**Contents / Main aspects to be considered**

The development of cellular structures that can go through several states of equilibrium, respectively can go from one geometric shape to another under the action of external stimuli (mechanical, thermal, acoustic or electro-magnetic stresses).

Recommended bibliography:

1. Yong Zhang, Qi Wang, Marcel Tichem, Fred van Keulen, 2020, Design and characterization of multi-stable mechanical metastructures with level and tilted stable configurations, Extreme Mechanics Letters, Volume 34, January 2020, Elsevier, <https://doi.org/10.1016/j.eml.2019.100593>.
2. Xiao Ju, Shaoqi Li, Yu Zhang, Penghao Wu, Yancheng Li, 2024, Design of multi-stable metamaterial cell with improved and programmable energy trapping ability based on frame reinforced curved beams, Thin-Walled Structures, Volume 202, September 2024, Elsevier <https://doi.org/10.1016/j.tws.2024.112120>.
3. Xiaojun Tan, Bing Wang, Kaili Yao, Shaowei Zhu, Shuai Chen, Peifei Xu, Lianchao Wang, Yuguo Sun, 2019, Novel multi-stable mechanical metamaterials for trapping energy through shear deformation, International Journal of Mechanical Sciences, Volume 164, <https://doi.org/10.1016/j.ijmecsci.2019.105168>.
4. David Restrepo, Nilesh D. Mankame, Pablo D. Zavattieri, 2015, Phase transforming cellular materials, Extreme Mechanics Letters, Volume 4, September 2015, Pages 52-60, Elsevier, <https://doi.org/10.1016/j.eml.2015.08.001>.

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Prof. dr. ing. Simona LACHE

Signature

Coordinator of the field of doctoral studies,

Prof. dr. ing. Luminița Maria SCUTARU

Signature