

Dr. Jaka Tušek

Assistant Profesor at Faculty of Mechanical Engineering

University of Ljubljana

Vortragssprache: EN



Elastocaloric cooling and heat-pumping: Designing elastocaloric devices

Refrigeration, air conditioning, and heat pumping are crucial for modern society. However, our standard refrigeration technology, namely vapor-compression technology, is old, environmentally harmful, and relatively inefficient. Elastocaloric cooling, which utilizes the latent heat during the martensitic transformation in superelastic shape memory materials, is considered one of the most promising environmentally benign alternatives to vapor-compression cooling technology.

In the first part of the talk, I will present the basics of different concepts of elastocaloric devices that can be distinguished according to the loading mode, heat transfer mechanism, and thermodynamic cycle. In the second part of the talk, I will discuss our recent advances in designing a tube-based regenerative elastocaloric device loaded in compression. This will include the buckling analysis of NiTi tubes, thermo-hydraulic evaluation of the tube-based geometry, and finally, the cooling and heat pumping performance of the tube-based elastocaloric regenerator.

Acknowledgements

This work was supported by European Research Council under Horizon 2020 program (ERC Starting Grant No. 803669). Stefano Dall'Olivo, Žiga Ahčin, Andrej Žerovnik, Luka Porenta, Jan Cerar, Parham Kabirifar, Miha Brojan, Jaka Tušek*