

## NOMATEN Hybrid Seminar

**Location:** NOMATEN seminar room

**Time:** 1 PM

**gotomeeting room (for online):** <https://meet.goto.com/NCBJmeetings/nomaten-seminar>

**Seminar date:** November 21st, 2023

**Title:** Phase-field modelling of microstructure evolution in displacive transformations

**Speaker name:** Prof. Stanisław Stupkiewicz

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**Abstract:** Displacive transformations, like deformation twinning or martensitic transformation, are associated with microstructure evolution, which involves nucleation, propagation and annihilation of interfaces. For instance, the functional properties of shape-memory alloys (SMAs), notably the shape-memory effect and pseudoelasticity, result from the reversible martensitic phase transformation which, at the micro-scale, proceeds through formation and evolution of complex martensitic microstructures. Spatially-resolved modelling of the corresponding phenomena can be efficiently carried out using the diffuse-interface approach, and specifically using the phase-field method. In this talk, our recent related results will be summarized. Size effects, rate-independent dissipation, and microstructure evolution in pseudoelastic SMAs during nano-indentation will be discussed. A finite-strain phase-field model of deformation twinning coupled with crystal plasticity will also be discussed, including a new look at the kinematics of twinning.

**Bio:** Stanisław Stupkiewicz is a professor at the Institute of Fundamental Technological Research (IPPT), Polish Academy of Science in Warsaw, Poland and head of the Materials Modelling Group. He graduated from the Warsaw University of Technology in mechanical engineering (1989) and received his PhD (1996) and habilitation (2006) at IPPT. Since 2011 he is a full professor. In 2013, he spent one year in Italy as a visiting professor at the University of Trento. His research interests include micromechanics of interfaces and interface layers, size effects, multiscale modelling of shape memory alloys, phase-field modelling of microstructure evolution, constitutive modelling of contact phenomena, contact mechanics, plasticity, crystal plasticity, and computational mechanics. Since 2020 he is a corresponding member of the Polish Academy of Science. He also serves as chairman of the Committee on Mechanics of the Polish Academy of Science. He is as an Associate Editor of Mechanics of Materials, Section Editor of Archives of Mechanics, and member of the editorial board of Archive of Applied Mechanics.