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INSTABILITIES IN SOLIDS ACROSS LENGTH SCALES

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ABSTRACT

The macroscopic mechanical properties and failure mechanisms of a truly diverse variety of solids are known to be the ultimate manifestation of instabilities that occur at micro-, nano-, and atomic length scales. Knowledge about how such instabilities arise on a lower scale and propagate to the macroscale is essential to describe, understand, predict, and ultimately to design the macroscopic response of complex materials, which requires advanced theories and computational techniques. This minisymposium will bring together experts from computational and theoretical solid mechanics, materials science, computational physics to survey recent advances and highlight the state of the art in the modeling of such scale-spanning instabilities and of how they manifest at macroscopic length scales. Topics of particular interest include but are not limited to:

- microstructural and atomic instabilities in active materials, such as for instance deformable dielectrics, shape memory alloys, phase-transforming metals and ceramics, and liquid crystal elastomers
- localization phenomena across length scales
- geometric instabilities in soft materials
- cavitation
- wrinkling and creasing
- instabilities in structural solids including buckling and snapping
- microstructural and macroscopic instabilities incomposites