Challenges and opportunities in phase-field modeling for the mechanics and physics of solids

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Abstract

Phase-field modeling, whose origin can be traced long back in time to the pioneering ideas of van der Waals, has experienced a revived interest in the past few decades and continues to be a subject of intense research by mathematicians, physicists and engineers alike. This talk reviews some of the key steps in the development of this fascinating subject within different disciplines, and, focusing specifically on the mechanics and physics of solids, highlights some challenges and opportunities for the future. For a more concrete discussion, three examples are briefly presented from the recent research in the group of the speaker, focusing on mechanics (fracture), phase transformations (precipitation/dissolution), and the coupling between the two (elastic microphase separation).

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