

[SY-A8]Symposium A-8

Chair: Thomas Hochrainer(TU Graz, Austria)

Wed. Oct 31, 2018 4:00 PM - 5:30 PM Room6

[SY-A8]A Sharp Phase Field Method

Invited

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Phase field modelling offers an extremely general framework to predict microstructural evolutions in complex systems. However, its computational implementation requires a discretisation scheme with a grid spacing small enough to preserve the diffuse character of the theory. We present a new formulation in which the interfaces are resolved with essentially one grid point with no pinning on the grid and an accurate rotational invariance, allowing to multiply the accessible linear dimensions by an order of magnitude or, conversely, to reduce the computational time by almost three orders of magnitude. We show that this Sharp Phase Field Method (S-PFM) reproduces interfacial kinetic properties with a very high accuracy. Then, we apply the model to a situation where conserved and non-conserved fields are coupled. Finally, to couple S-PFM to elastic fields, we propose a new elastic solver that efficiently treats strong elastic heterogeneities and that is mathematically stable.