

3rd Workshop on



MicroSim

A powerful tool for simulating
microstructure evolution using
the phase-field technique

Mode: Online + Offline
Venue: KPA auditorium,
Department of Materials Engineering,
IISc Bangalore

8 - 9 JULY 2023 | 10:00 AM - 6:00 PM

**TO REGISTER SCAN QR
or
[CLICK HERE](#)**

Registration fee: Rs. 1000 (on
spot) for attendees from industry



EVENT STRUCTURE

10 AM | July 8, 2023

*Overview of MicroSim (solvers, tools, updates, website, youtube).
Installation and pre-requisites.*

(Time: 10AM - 12PM)

Break: 15 mins

An introduction to the phase-field method.

(Time: 12:15PM - 1:45PM)

Break: 1 hr

*MPI-based solvers: Modeling of real alloys,
Single/multi-phase/multi-component solidification/precipitation.*

(Time: 2:45PM - 4:15PM)

Break: 15 mins

OpenFOAM solvers for setting up precipitation and solidification.

(Time: 4:30PM - 6:00PM)

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EVENT STRUCTURE

10 AM | July 9, 2023

AMReX solvers for solidification.

(Time: 10AM - 11:30AM)

Break: 15 mins

OpenCL based solvers for solidification and precipitation.

(Time: 11:45AM - 1:15PM)

Break: 1 hr

CUDA based solvers for precipitation and solidification.

(Time: 2:15PM - 4:15PM)

Break: 15 mins

Brief review of the post-processing tools using simulation data available.

(Time: 4:30PM - 5PM)

Computing: statistics and views, future developments and outlook

(Time: 5PM - 6PM)

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MicroSim

(Microstructure Simulator)



MicroSim is a project funded by National Supercomputing Mission, Govt of India. The project offers a set of codes capable of using high-performance computing to simulate microstructure evolution using phase-field technique. The software stack of MicroSim consists of phase-field codes that offer flexibility with discretization, models as well as the high-performance computing hardware (CPU/GPU) that they can execute on. Along with this the stack also consists of Multi-physics solver modules that are based on OpenFOAM and AMReX libraries. The stack has an integrator interface that is built using python that allows one to create the input and filling files required for the solvers as well as provides a consolidated framework to choose the solver, compile, execute and post-process simulation results. The project is developed and maintained by the consortium of researchers from IISc Bangalore, IIT Hyderabad, IIT Bombay, IIT Madras, C-DAC Pune, and Savitribai Phule Pune University. This is the third release of our phase-field software stack consisting of different phase-field models utilizing separate discretization strategies as well as the flexibility to run on different computing hardware (CPUs and GPUs). The phase-field models include the Grand-potential formalism, Kim-Kim Suzuki as well as the Cahn-Hilliard descriptions. The discretizations include FDM, FVM and FFT.



[GitHub Repo](#) | microsim.co.in



CONTRIBUTORS

- Abhik Choudhury (IISc Bangalore) (Grand-potential based solvers)
- Nasir Attar, Abhishek Kalokhe (CDAC pune) (AMReX solvers)
- Dasari Mohan, M.P. Gururajan, Gandham Phanikumar (IIT Bombay, IIT Madras) (KKS OpenCl and FFTW codes)
- Saurav Shenoy, Pankaj and S. Bhattacharyya (IIT Hyderabad) (KKS Nvidia-CUDA)
- T. Dutta, S. Bhure, R.K. Singh, U. Kartik, B. Karmakar, B. Bhadak (IISc Bangalore) (OpenFOAM solvers and documentation)
- Ajay Sagar (IISc Bangalore) (Python based GUI)
- Swaroop Sampad (IIT Madras), Ankosh Deshmukh, Abhishek Kumbhar, Vaishali Shah (SPPU)