

4th Workshop on



MicroSim

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

Mode: Online + Offline
Venue: Computer Center Seminar Hall, IIT Madras

22 - 26 JANUARY 2024 | 10:00 AM - 6:00 PM

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Registration fee: Rs. 5000 (on spot) for attendees from industry



EVENT STRUCTURE

Session 1 (10 AM)

January 22

Overview of MicroSim and phase-field method. MPI-based solvers: Modeling of real alloys, Single/multi-phase/multi-component solidification/precipitation.

January 23

OpenFOAM solvers for precipitation and solidification.

January 24

AMReX solvers for solidification.

January 25

CUDA based solvers for precipitation and solidification.

January 26

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

Session 2 (2 PM)

Hands-on session for MPI-based solvers.

Hands-on session for OpenFOAM solvers.

Hands-on session for AMReX solvers.

Hands-on session for CUDA based solvers.

Hands-on session for post-processing tools.

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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 fourth 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, Anshika Kushwaha (IISc Bangalore) (Python based GUI)
- Swaroop Sampad, Pradeep (IIT Madras), Ankosh Deshmukh, Abhishek Kumbhar, Vaishali Shah (SPPU)