CHiMaD Phase Field Workshop VIII, April 23 - 25, 2019

Dear Phase Field Practitioner,

We are currently planning the agenda for CHiMaD Phase Field Workshop VIII to be held, as usual, at CHiMaD HQ at Northwestern University April 23 - 25, 2019. The focus of the workshop will be on phase field benchmark problems for nucleation, and we will also devote some time to discussions on fracture modeling using the phase field approach, machine learning, data analytics, and uncertainty quantification in phase field modeling.

Because this workshop will engage the participants more deeply than previous ones, we caution that the workshop may not be suitable for all graduate students, especially those who are just starting their research and are new to phase field modeling.

In order to set the stage for active (and lively!) discussions at the workshop, we are sending out this document in advance. Please take a look, and send us any thoughts and comments you have on how to structure discussions, and please do come prepared with lots of thoughts and opinions and ready to share them with the workshop. The presentations on nucleation from the previous workshop are excellent resources for background material. If you do not have access to the presentations, please send Begum (e-gulsoy@northwestern.edu) and email and she can arrange access.

Phase field Benchmark problem set on nucleation: Based on the presentations and discussions on phase field approaches to nucleation in Phase Field Workshop VII we would like to work towards formulating a set of Benchmark problems focused on phase field approaches to nucleation. This is not an easy task, as there are many aspects that will have to be considered, for example
- How can problems make clear what the limitations and flaws there are on nucleation theory while useful results can still be obtained?
- How are pedagogical aspects (for use in teaching) balanced against technical and code implementation aspects?
- Should the focus be on homogeneous or heterogeneous nucleation, or should the problem set address both? Which flavors of homogeneous or heterogeneous nucleation lend themselves best to a Benchmark problem?
- How can a set of problems be formulated that tests aspects of code implementation without getting the problem formulation too technically complicated?
- How can issues with random number generators and dynamical mesh refinement be handled to produce comparable outputs from different code implementations?

- What are appropriate outputs from the numerical solutions that can be compared in a meaningful way?

In order to handle these and other issues, we need active participation from the community. We therefore plan to organize breakout sessions during the workshop. These breakout sessions will each discuss some aspects of how to construct meaningful benchmark problems on nucleation, and then report back to the Workshop.

Fracture, Machine learning, Data analytics, and Uncertainty Quantification: We plan to have a few presentations by invited speakers on these subjects. The idea is to generate discussions at the workshop to set the stage to follow-on workshop(s) to deep with these topics in more depth.

As usual we rely on participation by and input from the community to realize our goals of community-driven benchmark problems and other resources for phase field development and modeling. We are looking forward to hearing from you and seeing you – and hearing you! – at the workshop!