

Two-Dimensional Dendritic Growth Using Phase-Field Model Report

CS 294-73 Group H

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1 Stability Constrain

The stability of the diffusion of the ϕ is basing on the $\frac{h^2}{dt}$

2 Parameter Effect on Dendritic Growth

The following existing classes will be directly utilized:

Point, Box, RectMDarray

VisitWriter, WriteRectMDArray

CH_Timer

A new class **DendriticGrowth** is defined, along with a modified version of the original **RK4**. Inside **DendriticGrowth**, public member data and functions contain ϕ and u fields, as well as update and increment functions for both fields. As **DendriticGrowth** is the only input class for **RK4**, class setup in **RK4** is modified accordingly.

3 Algorithm and Flow Chart

Figure 1: Pseudo code diagram for dendritic growth using phase-field model

1. Initialize the modeling parameters including timestep dt , end time t , grid dh , domain size L , etc.;
2. Initialize the ϕ and u field;

3. Evaluate the gradient and laplacian operators by 2nd order central difference scheme;
4. Evaluate the orientation angle θ and W ;
5. Evaluate RHS of ϕ and u euqations, update ϕ and u using RK4;
6. Plot intermidiate time step contour of ϕ and u .