SOLVER DESCRIPTION

The python code implements the phase-field model derived by Kobayashi (https://doi.org/10.1016/0167-2789(93)90120-P) for simulations of crystal growth. The code implements the phase-field Eq. (3) and temperature Eq. (5) using a finite-difference explicit numerical scheme. The derivatives are second order in space and first order in time. The anisotropic terms in the phase-field Eq. (3) from the paper (the first two terms on the right hand side) are simplified and discretized according to Eq. (3.2) of the Warren-Boettinger article https://doi.org/10.1016/0956-7151(94)00285-P .

Parameters:
The parameters of the simulation can be assigned through the params dictionary in the file config.py. The definition of the parameters are mentioned beside the assignment operation.

Initial condition :
The initial condition is currently hard-coded in the code in main.py. For a different configuration the initial condition needs to changed.

Boundary condition :
The boundary condition is also hard-coded in main.py to isolate or neumann condition. Other boundary conditions can accordingly be implemented.

Dimensionality:
The code currently works in 2-D. For 3-D all the spatial discretization (laplacian and gradients) need to be extended to z-direction. In addition an expression for the anisotropic term in the phase-field equation also needs to be derived before extending the implementation.