SOLVER DESCRIPTION

The C++ 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-volume explicit numerical scheme. The derivatives are second order in space and first order in time (Euler scheme). The Eqs. are discretized using the numerical scheme derived in Provatas and Elder book (Provatas, Nikolas, and Ken Elder. *Phase-field methods in materials science and engineering*. John Wiley & Sons, 2011)

Parameters:
The simulation parameters are defined and assigned through input.in file. The description of the parameters and how to assign them can be found in accompanying documentation named inputfile_description.pdf.

Initial condition:
The implementation of the initial condition is also done through the input.in and is fairly generalized for further extension. Currently square, rectangle, circle and constant initial condition can be initialized.

Boundary condition:
The implementation of the boundary condition is also done through the input.in and is fairly generalized for further extension. Currently NOFLUX and PERIODIC boundary conditions can be initialized.

Dimensionality:
The code currently works in 2-D and can be easily extended to 3-D by extending the spatial discretization in anisotropy.cpp and gradient.cpp.