

Questions with respect to:

FiPy User's Guide (Sept. 16, 2005, Version 1.0)

Page 65: 9.2 Module examples.phase.anisotropy.input

(1) What is θ in the equation $\Phi = \tan\left(\frac{\theta}{2} + \frac{N}{2} \arctan \psi\right)$?

(2) If $\theta=0$, $\Phi = \tan\left(\frac{N}{2} \arctan \psi\right)$,

$\Phi_\psi = \frac{d\Phi}{d\psi} = (1 + \tan^2\left(\frac{N}{2} \arctan \psi\right))\left(\frac{N}{2} \frac{1}{1 + \psi^2}\right) = \frac{N}{2(1 + \psi^2)}(1 + \Phi^2)$, however, in the program, the variable $\text{dbdpsi} = -N * 2 * \Phi / (1 + \Phi^2)$, I do not know whether dbdpsi is equal to Φ_ψ ?

(3) On page 34, it is clearly stated that "ExplicitDiffusionTerm is provided only for illustrative purposes", but why on page 67, the diffusion term in `phaseEq` is constructed using the "ExplicitDiffusionTerm"? Would the result be the same if using the "ImplicitDiffusionTerm" instead?

(4) On page 34, when constructing the implicit source term, why is it necessary to test whether `mVar` is greater than zero or less than zero? In the case of `mVar < 0`, how the `ImplicitSourceTerm` in the program could match $\nabla A \nabla \zeta + \phi(1 - \phi)m$?

(5) I wish to see the dendritic growth and therefore, I have changed the parameters as requested on page 65, i.e. `numberOfCells=500`, `steps=10000`, `radius=dx*5.`, `seedCenter=(0.,0.)`, `initialTemperature=-0.5`. The program is attached. The program runs slowly as expected but why I could not see any structure even after 155 steps?