TEST 4

This unit test aims to decouple the phase-field evolution equation from the temperature equation and test if the temperature equation evolves correctly by solving a 2-D heat diffusion equation without any source term. The temperature field is initiated by a step function in a square domain and allowed to evolve to see if the system homogenizes. This basic aim can be summarized as:

1. Check whether inputs are read correctly by checking input.in and the corresponding output.in in the output folder.
2. Check if the Filling Algorithms are working correctly such as Fill_Cube and Fill_Constant.
3. Plot the output temp.vtk files in paraview to see homogenization of temperature field due to heat diffusion over time.
4. The phase field should not evolve over time since it is initialized to a constant value.

The test4_input.in contains the keys to run and implement the unit test. Some important points that warrants attention are as follows:

1. To switch off the driving force terms in the phase-field equation select

gamma = 0.0;
alpha = 0.0;

2. Switch-off the noise term by setting **a = 0.0;**
3. Switch-on the anisotropy term by setting **delta = 0.0;**
4. Switch-off the coupling term (which is also the source term) in temperature equation by setting **K = 0.0;**
5. Fill half square domain by a value of temp = 1 and the other half by temp = 0 by invoking

Fill_Cube = temp,1.0,0,50,0,100;

6. Fill the entire domain by a constant value of phase field as

Fill_Constant = phi,0.0;

7. Rest of the keys can be found in the input file.

The plots are presented in the output folder, where the solution passes the tests 1-4 stated above.