

Readme (heart3D, bone3D, blood3D, brain3D) for ISIDE
(InsilicoIDE version 1.4.0.1)

- heart3D.isml

Solve 3D Fitzhugh-Nagumo equation under initial condition of a local stimulus.
It has three segments of /points/surface/volume (segment1,4,3) to which initial condition of variable u is assigned. It can be switched in physical quantity/problem condition dialog.

Input morphology file:

¥insilicoIDE¥sample¥SimulateWithFreeFem¥morphology¥heart3D.vtk

Creat morphology file: heart3D.mesh (Medit file) at the same directory of exported FreeFem++ file

Notice: stimulus propagation is very slow. If time advance to 1.0 or later, you can see the change.

- bone3D.isml

Solve elasticity equation for thigh bone.

Pull up and push down forces are applied to the top of the bone.

Bottom area is fixed.

Longitudinal Z directin component of displacement and stress are shown successively.

Input morphology file:

¥insilicoIDE¥sample¥SimulateWithFreeFem¥morphology¥bone3D.vtk

Creat morphology file: bone3D.mesh (Medit file) at the same directory of exported FreeFem++ file

- blood3D.isml

Solve Navier-Stokes equation for blood vessel.

Reynolds number is used for scaling.

Velocity and pressure boundary conditions are applied to inlet, outlet and wall of the vessel.

Because input velocity is constant, only transient behavior is simulated.

Input morphology file:

¥insilicoIDE¥sample¥SimulateWithFreeFem¥morphology¥blood3D.vtk

Creat morphology file: blood3D.mesh and blood3D.scale.mesh (Medit file) at the same directory of exported FreeFem++ file

Notice: FreeFem++ conversion takes a few minutes because of Medit file creation from segment files.

Be patient.

- brain3D.isml

Solve 3D poisson equation for real brain strcuture

Each segment of skull, grey, Csf and White has different conductivity.

Conductivity values are stored in a file (sigma.txt) and read by FreeFem++.

Input morphology file: ¥insilicoIDE¥sample¥SimulateWithFreeFem¥sigma.txt

Notice: Put sigma.txt file in the same directory of exported FreeFem++ file.

- Post processing

FreeFem++ build in plot function:

If you see initial mesh figure, press return key. Then, simulation starts.

Medit post processing tool:

If you see mesh figure, right click and select Data→Toggle metric.

If you want to see inside the figure, select Clipping→Toggle clip and Edit clip (cross section moves)

Rotation → mouse operation

Translation → arrow cursor ley →← ↑ ↓

Zoom in/out → ALT + mouse forward/backward operation

Operation detail, please refer to Medit manual,

<http://hal.inria.fr/docs/00/06/99/21/PS/RT-0253.ps>

Details of each simulation will be given shortly.

Also, please refer to a paper listed in publication of home page

(<http://www.physiome.jp/documents/index.html>)

■ Finite Element Method Analysis in insilicoIDE

Oka et al., Proceeding of The 50th Annual Conference of Japanese Society for Medical and Biological Engineering