

Read Me – heart simulator

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We provide our heart simulator only for demonstration of the following paper. Please do not distribute the software (note: the heart model is distributed as PD license).

[1] T Ijiri et al. A Kinematic Approach for Efficient and Robust Simulation of the Cardiac Beating Motion, PLoS ONE, PLoS ONE 7(5), 2012.

“**HeartSim_SimpleLV**” contains our simulator with simple LV model (in Figures 4, 5 in [1])

“**HeartSim_Heart**” contains our simulator with a full heart model (generated based on the heart model in Figure 7-9 in [1]).

The software is written by **C++**, **OpenGL**, and **CGtoolKit** with Visual studio 2010. If you are interested in the source code, please contact us (takashi.ijiri@riken.jp).

Note: It is difficult to distribute the full heart model in the paper because of a license issue.

Note: the heart model and simple LV model is provided Public Domain License.

Note: Source codes does not contain enough comments and documentation (some comments are in Japanese. Sorry for the inconvenience.)

Memo 1: heartSim in **SimpleLV** uses $h = 0.005$.

Memo 2: heartSim in **SimpleLV** uses $h = 0.01$.

To boot

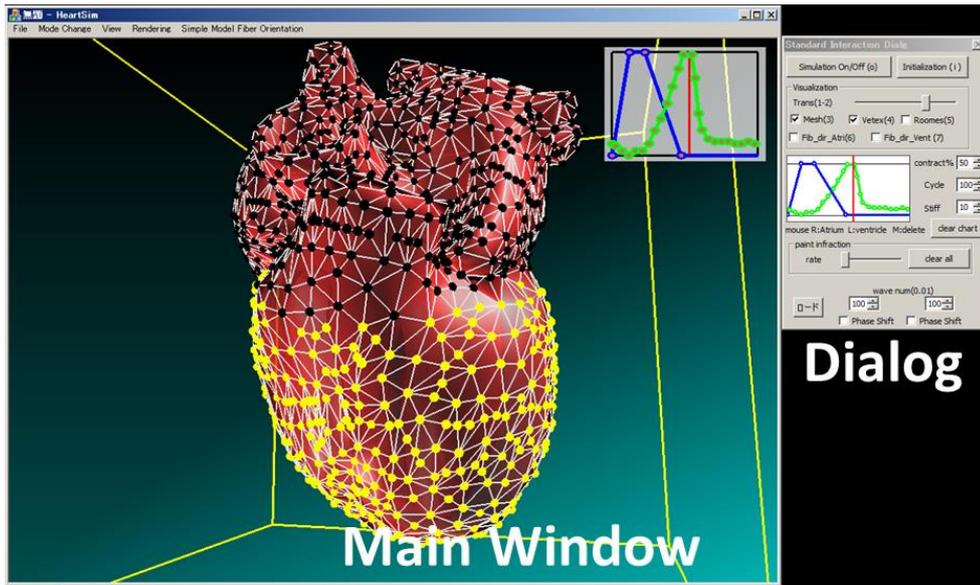
+ Windows 7 64bit or windows Vista 64bit

+ double click “HeartSim.exe”

If you fail to boot...

1. install visual studio runtime <http://www.microsoft.com/ja-jp/download/details.aspx?id=14632>
2. install CgToolkit <http://developer.nvidia.com/cg-toolkit>

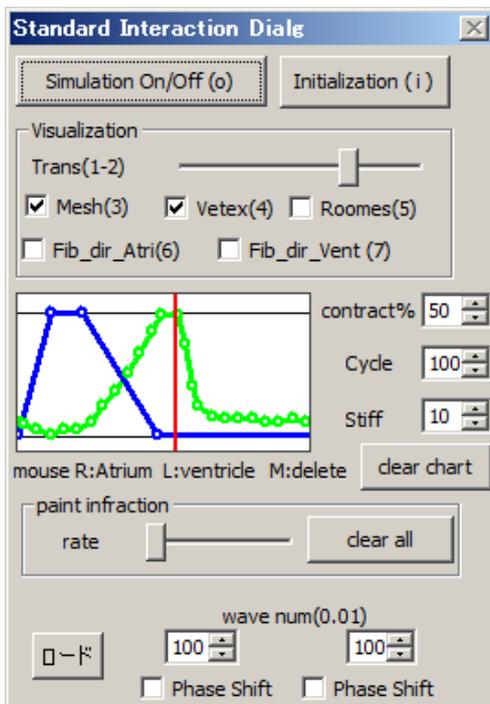
Our Simulator screen shot



Manipulation in Main Window

- + L-dragging : camera translation
- + R-dragging : camera rotation
- + M-dragging : camera zooming
- + shift + L-dragging : add external force
- + ctrl + L-dragging : temporally cut the model
- + ctrl + L-clicking : cancel the temporal cut

Manipulation with the dialog.



- 1) Simulation On / off
- 2) Initialize the model shape

Visualization

- 3) slider → set transparency of the model
- 4) Mesh / Vertex / Rooms / Fib dire Atrium / Fib dir Ventricle
→ On/off the visualization of these elements

Local Contraction (chart)

- L-drag in the chart*: set contraction chart for ventricle
 - R-drag in the chart*: set contraction chart for Atrium
 - M-click in the chart*: remove control points for the chart
- 5) Contract % : set A^{mc} value (*0.01)
 - 6) Cycle : set beating cycle (T) (*0.01)
 - 7) Stiff : set stiffness iteration number M

Paint infraction

8) slider : set infraction rate for painting

Space + L-drag in the main widow to paint the infraction

→ painted (black) local regions stop contracting.

9) clear all : initialize infraction field.

Set different fiber orientation only for simple ventricle model

Menu > Simple Model Fiber Orientation

[Fib circle] circular fiber orientation

[Fib vertical] vertical fiber orientation

[Fib spiral] spiral fiber orientation

[fib Inv spiral] spiral fiber orientation (orientation of inside and outside are inverted.)