

Clinical Data:

Contrast-enhanced cardiac CT angiography time series data from a 70-year-old male.

Notes:

This data can be used to demonstrate the automatic left ventricle model construction capability of SimVascular. The model construction pipeline includes machine-learning-based whole heart segmentation, surface editing, registration, and meshing techniques to automatically construct simulation-ready LV meshes and boundary conditions from modeling of the LV hemodynamics. The data contains

1. CT angiography of the chest taken at 10 time points during the cardiac cycle.
2. The corresponding whole heart segmentations, which are automatically produced from a trained neural network (UNet).
3. The surface meshes of the left ventricle reconstructed from the whole heart segmentations with boundary faces.
4. The registered surface meshes that share the same mesh connectivity across all time points.
5. The mesh-competete folder that contains the volume mesh, boundary conditions and input scripts for a deforming-domain CFD simulation of LV hemodynamics using the svFSI solver.

The Python scripts to automatically construct the LV meshes from image data and the pretrained neural network weights are available at: <http://simvascular.stanford.edu/cmbbe2023/cardiac-modeling/>

Publications:

Kong, F., & Shadden, S.C. (2020). Automating Model Generation for Image-based Cardiac Flow Simulation. *J Biomech Eng*, 142(11): 111011.