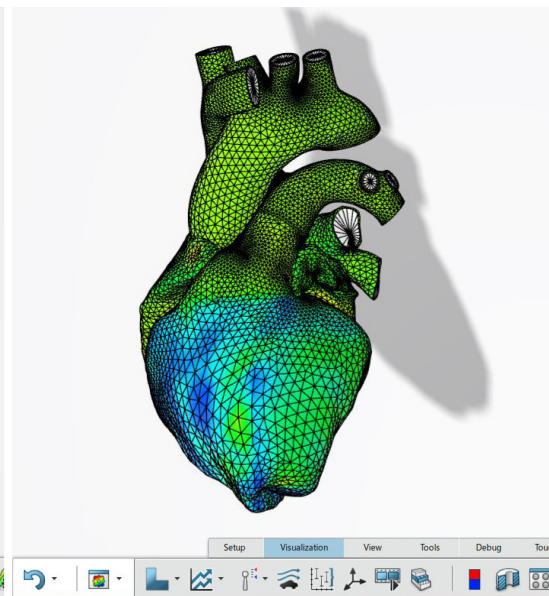
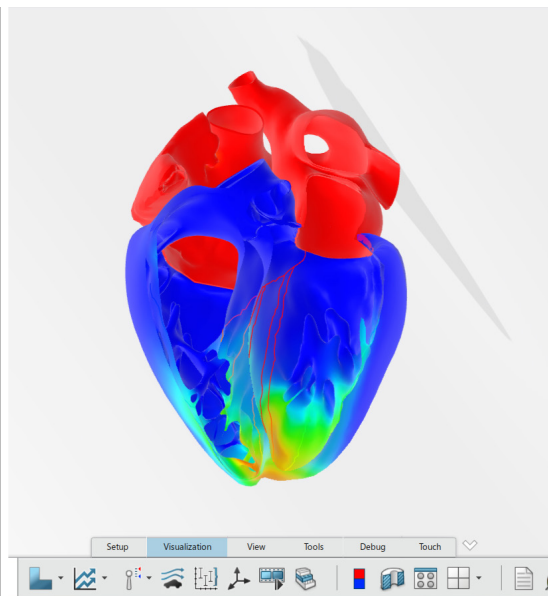
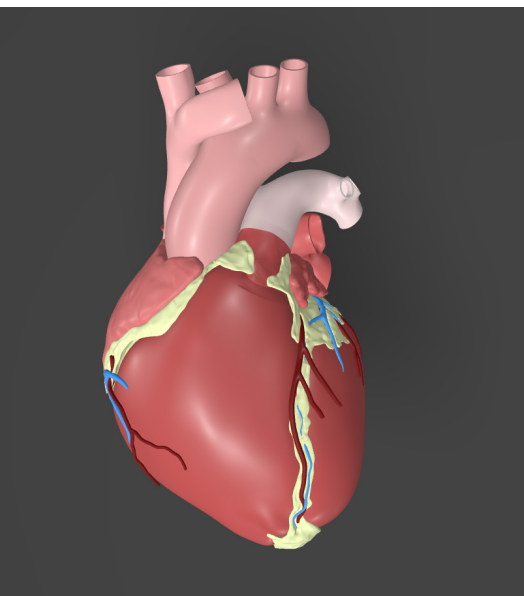




LIVING HEART HUMAN MODEL

REVOLUTIONIZING CARDIOVASCULAR SCIENCE
THROUGH REALISTIC SIMULATION



IF WE APPLY THE POWER OF REALISTIC SIMULATION TO HUMAN MODELING, WE CAN REVOLUTIONIZE PATIENT CARE.

The **SIMULIA Living Heart Human Model** is a high-fidelity multiphysics model of a healthy, 4-chamber adult human heart and proximal vasculature. The dynamic response of the Living Heart is governed by realistic electrical, structural, and fluid (blood) flow physics. With this model, medical professionals, researchers, and device manufacturers will be able to rapidly conduct virtual experiments in a highly realistic 3D environment. The Living Heart can readily be used to study cardiac defects or

diseased states and explore treatment options by modifying its geometry, loading, or electromechanical properties. In addition, medical devices can be inserted into the model to study their influence on cardiac function, validate their efficacy, and predict their reliability under a wide range of operating conditions.

To learn more about the **SIMULIA Living Heart Human Model**, visit: www.3ds.com/heart.

GEOMETRY

- Aortic Arch
- Aortic Valve
- Chordae Tendineae
- Coronary Arteries
- Coronary Veins
- Fat
- Fossa Ovalis
- Left Atrium
- Mitral Valve
- Pulmonary Trunk
- Pulmonary Valve
- Right Atrium
- Superior Vena Cava
- Tricuspid Valve
- Ventricles

MESHING

- Coarse Representation
- Medium Representation
- Fine Representation

SOLUTION VERIFICATION

- Electrical: Mesh Convergence
- Electrical: Temporal Convergence
- Mechanical: Mesh Convergence

MODEL RUN TIME (APPROX. WALL CLOCK RUNTIME ON 64 CORES)

- Coarse: 6 hrs.
- Medium: 9 hrs.
- Fine: 14 hrs.

SIMULATION TYPES

- Electrical
- Mechanical

CODE VERIFICATION

- Action Potential Profile with Respect to Refractoriness, Υ
- Diffusion and Recovery of an Electrical Wave Through Cardiac Tissue
- Passive Cardiac Material Model
- Active Cardiac Material Model

TECHNICAL PUBLICATIONS

- Baillargeon, et. al., "Human Cardiac Function Simulator for the Optimal Design of a Novel Annuloplasty Ring with a Sub-valvular Element for Correction of Ischemic Mitral Regurgitation," Cardiovascular Engineering & Technology, USA, 2015
- Baillargeon, et.al., "The Living Heart Project: A robust and integrative simulator for human heart function," European Journal of Mechanics A/Solids, USA, 2014.
- Genet, et. al., "Abaqus/Standard-based quantification of human cardiac mechanical properties," 2014 SIMULIA Community Conference Proceedings, USA, 2015.

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