Integrated Finite Element and Circulatory Model for Predicting Hemodynamic Effects of Left Ventricular Impairment, Resynchronization and Remodeling

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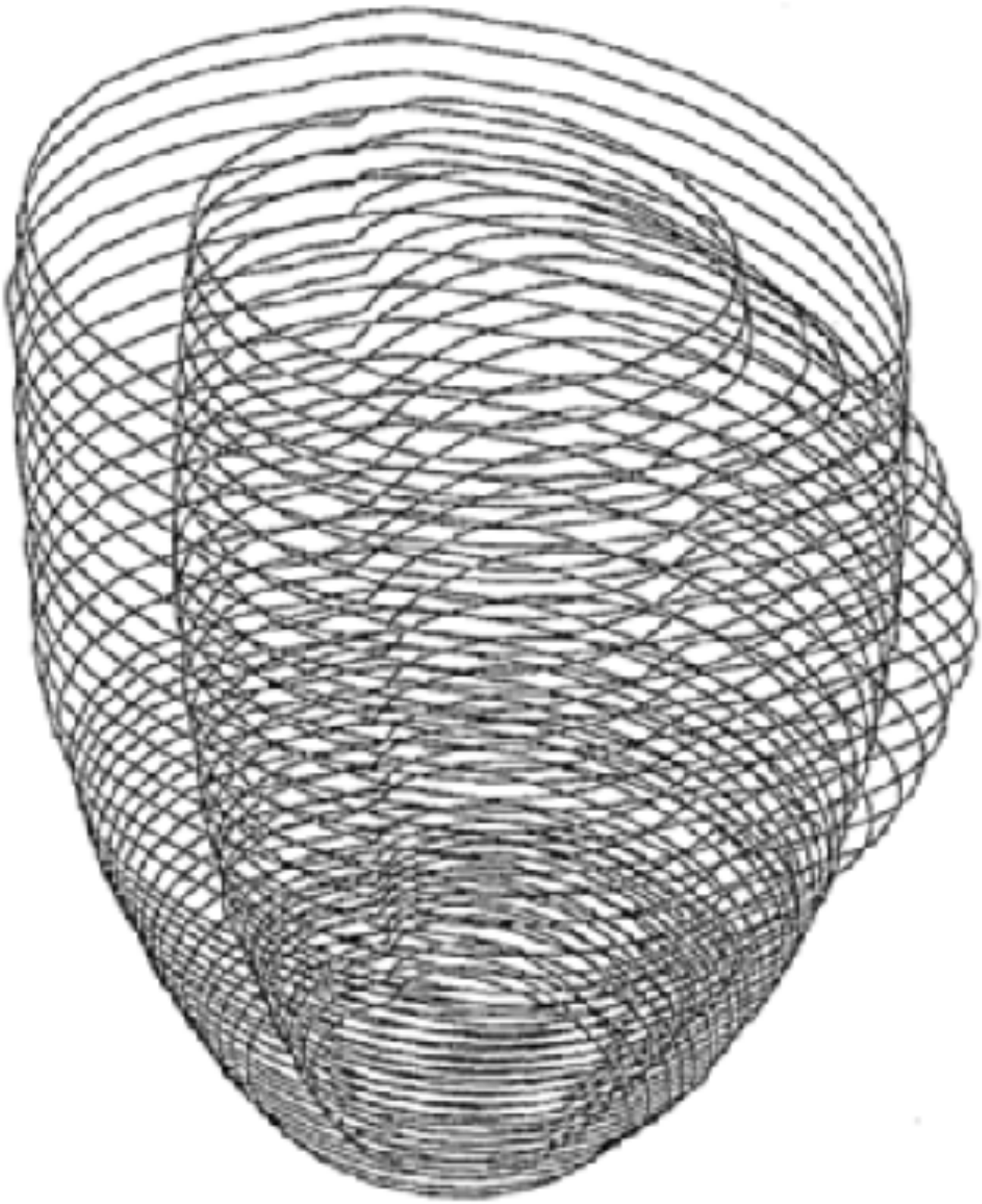
Technology description

This invention and the associated software provide a useful platform for modeling and simulation that assists the development and operation of a variety of medical devices pertaining to cardiovascular diseases. The computational model determines the dynamics of a left ventricle continuously over consecutive cardiac cycles by integrating finite element model of the left ventricular wall with a complex electrical analog circulatory model. It allows prediction of hemodynamic outcome of a regional left ventricular impairment.

Application area



Left Ventricular time-varying elastance

Ventricular restoration surgery

Surgical treatment of heart failure

Cardiac resynchronization therapy using biventricular pacing

Cardiovascular medical devices

Pharmaceutical research

Advantages

Dynamic and efficient integration of complex electrical circulatory model with finite element model.
Effective for both transient and steady states of cardiovascular dynamics.
Predicts hemodynamic effects of action potential propogation.
Many cardiac cycles can be processed continuously to reveal transient phase quickly.
Model generates realistic hemodynamic waveforms in response to physiological variables.
The model can assess outcomes of
left ventricle infarction
cardiac resynchronization therapy
ventricular restoration surgery

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