2011-028 Fluid Flow Analysis for Cardiovascular Diagnostics

Published date: June 14, 2011

Technology description

Following a heart attack or the development of some cardiovascular diseases, the movement of the heart walls during the cardiac cycle may change, which affects the motion of blood through the heart. Currently, valvular blood flow can be monitored using imaging techniques such as Doppler ultrasound or time-series MRI, however, the spatial resolutions of such techniques are poor. In addition, it is not possible to observe the detailed interaction of the blood flow and the endo-cardial surface of the heart. Therefore, the formation of cardiac thrombus remains difficult to predict. If a physician were able to visualize or quantitatively measure the detailed alteration of the blood flow by altered contraction, they may be able to make better diagnosis or treatment plans.
Researchers at Rutgers University have developed a cardio diagnostic algorithmic tool which combines high resolution cardiac CT 4D data with Navier-Stokes equations solutions for fluid dynamics to create patient specific blood flow simulations. This invention encompasses movement of the boundaries of the heart using methods for fluid flow analysis and open surface phenomena. The Navier Stokes equations, which describe the motion of fluid substances (liquid or gas) in spa ce, are used to calculate flows, pressures, and movement statistics at cardiac or vessel walls, along with detailed geometry of the heart obtained from time-series CT scan.

Advantages

This invention can reveal the interactions between the complex trabeculae of the heart wall and the blood, which has never been possible before. Simulations performed on diseased hearts, such as those suffering from ischemia and arrhythmia, and comparing the blood flows between them may help in diagnosis and treatment.

Institution

Rutgers University

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com