



Virtual Heart

Graphics

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Description of the Technology:

The model is the result of two decades of research on computational methods to solve the equations of cardiac fluid dynamics. Typically, the design of the prosthetic device under investigation is integrated into the heart model. The computer then generates a prediction of how the device would function in a heart with the anatomical and physiological properties specified by the user. The results can be produced in a variety of forms: movies that illustrate the motion of the blood and tissues, and still pictures that portray information such as flow patterns and pressure contours in the heart.

In such studies, device parameters are varied systematically in order to achieve optimal performance according to criteria specified by the user. The simulations make subsequent experimental work more productive by focusing attention on designs with a high probability of success.

Features and Benefits:

The design of prosthetic cardiac devices (valves, pumps, LVAD's, etc.) is a time-consuming and costly task, requiring numerous trial tests on the laboratory bench or in animals. Computer simulations would make the design process more efficient by allowing researchers to experiment with different elements of design without actually having to build and test a series of devices.

Applications:

Major applications include parametric studies aimed at optimizing the design of prosthetic cardiac valves, left ventricular assist devices, total artificial hearts, any device in which a fluid interacts with an elastic structure or vessel of complicated geometry.

Patent Status:

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