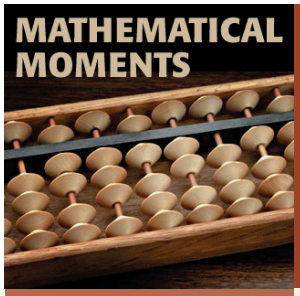


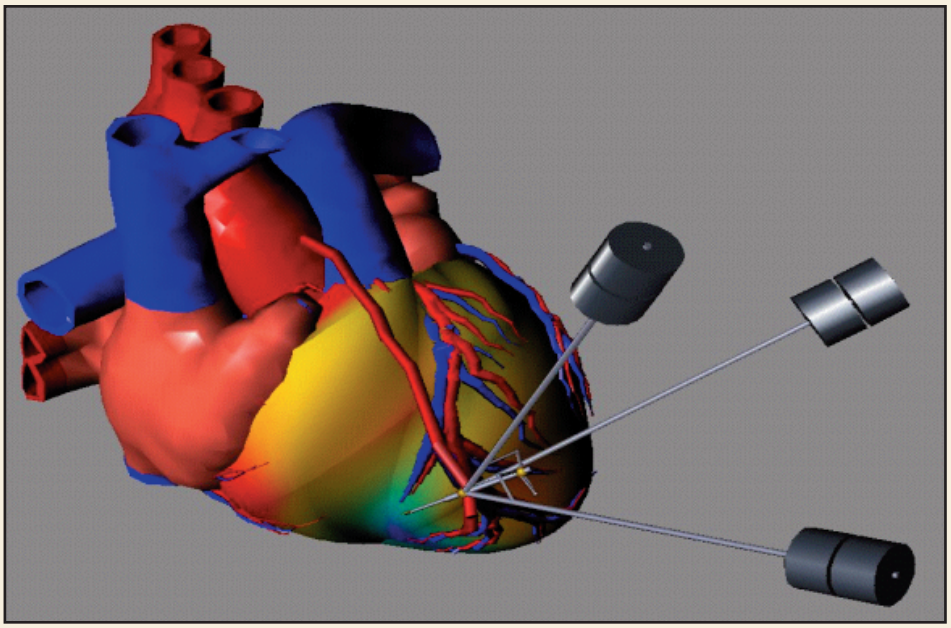
Experimenting with the Heart

Experimenting with real human hearts isn't possible, but experimenting with accurate mathematical models of the human heart has led to a new understanding of its complex processes. Mathematics and the computer can replace years of experimentation in laboratories. For example, understanding resulting from mathematics greatly speeds up the design and implementation of artificial valves.

Equations based on Hooke's Law model the geometry of the heart by representing muscle fibers as closed curves of different elasticities. The Navier-Stokes equations, which describe all fluid flows, model blood flow in and around the heart. The fact that the heart's shape is constantly changing, however, makes the equations especially hard to solve, and a precise solution to the equation can't be found. Approximate solutions are generated by computer.

For More Information:

What's Happening in the Mathematical Sciences, Vol. 1, Barry Cipra.



Photograph courtesy of Professor Peter Hunter.

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