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Frontiers of Scientific Computing Lecture Series

Numerical Simulation of Blood Flows in Human Arteries**Xiao-Chuan Cai, University of Colorado Boulder**

Professor

Digital Media Center 1034
November 10, 2017 - 11:00 am**Abstract:**

We discuss a parallel multilevel domain decomposition algorithm for the simulation of blood flows in arteries by solving a system of nonlinear partial differential equations consisting of an elasticity equation for the artery and an incompressible Navier-Stokes system for the blood flow. The system is discretized with a finite element method on unstructured moving meshes in 3D and solved by a Newton-Krylov algorithm preconditioned with an overlapping Schwarz method. A non-standard, isogeometric coarse mesh is introduced to ensure that the algorithm is scalable in terms of the total compute time when the number of processors is large. Several mathematical, bio-mechanical, and supercomputing issues will be discussed in detail. Simulation of blood flows in patient-specific pulmonary and cerebral arteries will be presented.

Speaker's Bio:

X.-C. Cai's research interests are in the area of scientific and engineering computing including domain decomposition and multigrid methods for linear and nonlinear partial differential equations.

He received his PhD in 1989 from Courant Institute. He was a postdoc during 1989-1990 at Yale University. During 1990-1993, he held the position of an Assistant Professor at the University of Kentucky. Since 1993, he has been a professor in the Department of Computer Science, University of Colorado Boulder, and the positions he held include Director of Graduate Studies (2002-2007) and Department Chair (2007-2011). He is also an affiliated faculty member in the Department of Applied Mathematics, University of Colorado Boulder. X.-C. Cai is a SIAM Fellow (Class of 2016).

This lecture has refreshments @ 10:30 am