COLLOQUIUM

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LEAST-SQUARES FINITE ELEMENT METHOD FOR COMPUTATIONAL FLUID AND SOLID MECHANICS

Abstract

It has become standard practice that different numerical schemes are employed for each type of differential equations. In this talk I will briefly review a simple, universal, robust and efficient method–the least-squares finite element method (LSFEM). I have shown that without any special treatments by using only one formulation the LSFEM is able to simulate almost all kinds of problems in fluid dynamics and electromagnetics. New examples from magnetohydrodynamics (MHD) and solid mechanics will be given to support my opinion. Without the use of complicated flux-splitting for shock-capturing and an expensive Poisson solver for correcting magnetic field the simple LSFEM can capture shocks and complex flow patterns in compressible MHD. The LSFEM is able to give simultaneous solutions for displacements, drilling rotation and stresses in elasticity including incompressible materials, and for deflection, slopes, moments and shear forces in plate bending with an optimal rate of convergence for all variables.

372 Science and Engineering Building
Thursday, November 1st, 2001
3:00 to 4:00 P.M.
(Refreshment at 2:30 to 3:00 P.M. in Room 368,
Science and Engineering Building)

About the speaker

Dr. Bo-nan Jiang received his MS from Tsinghua University, Beijing in 1964 and Ph.D. from the University of Texas at Austin in 1986. He worked at Chinese Aeronautical Establishment for 16 years and NASA Glenn Center for 10 years. Since 1998 he has been an assistant professor at Oakland University. He authored a book in Springer Scientific Computation Series, "The Least-Squares Finite Element Method".