PIMS / AMI Seminar

Friday, November 30, 2012
3:00 p.m.
CAB 657

"Implicit/Explicit Schemes for the Navier-Stokes Equations"

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Abstract

We consider the implicit/explicit Schemes for the Navier-Stokes Equations and prove the stabilities and optimal error estimates under the corresponding stability conditions, where the schemes are almost unconditionally stable and convergent for the smooth initial data $u_0 \in H^2$, i.e., the time step size τ satisfies $\tau \le C_0$; and the schemes are almost weak unconditionally stable and convergent for the non-smooth initial data $u_0 \in H^1$, i.e., the time step size τ satisfies $\tau|\log h| \le C_0$ for the mesh size $0 < h < 1$; and the schemes are conditionally stable for the non-smooth initial data $u_0 \in L^2$, i.e., the time step size τ satisfies $\tau h^{-2} \le C_0$.

Moreover, the Euler implicit/explicit scheme based on the mixed finite element (also known the time-space finite element (TSFE) iterative method) is applied to solve the stationary Navier-Stokes equations. The almost unconditionally stability is proven and the optimal error estimates uniformly in time are provided for the scheme. Compared with the standard the Stokes, Newton and Oseen finite element iterative methods, the TSFE is an efficient method for solving the stationary Navier-Stokes problem with a slightly small viscosity and a large saving in computational time is achieved.

Refreshments will be served in CAB 649 at 2:30 p.m.