



**The Hong Kong Polytechnic University
Department of Applied Mathematics**

**Seminar
On**

**Superconvergence of Mixed Finite Element Methods
for Optimal Control Problems**

by

**Prof. Yanping Chen
Department of Mathematics
South China Normal University
Guangzhu, Guangdong, China**

Abstract

We investigate the superconvergence property of the numerical solution of a quadratic convex optimal control problem by using rectangular mixed finite element methods. The state and co-state variables are approximated by the lowest order Raviart-Thomas mixed finite element spaces and the control variable is approximated by piecewise constant functions. Some realistic regularity assumptions are presented and applied to error estimation by using an operator interpolation technique. We derive L^2 superconvergence properties for the flux functions along the Gauss lines and for the scalar functions at the Gauss points via mixed projections. Moreover, global L^2 superconvergence results are obtained by virtue of an interpolation postprocessing technique. Thus, based on these superconvergence estimates, some asymptotic exactness a posteriori error estimators are presented for the mixed finite element methods. Finally, some numerical examples are given to demonstrate the practical side of the theoretical results about superconvergence.

Date : 12 December, 2008 (Friday)
Time : 3:00 – 4:00 p.m.
Venue : Departmental Conference Room HJ610
The Hong Kong Polytechnic University

***** ALL ARE WELCOME *****