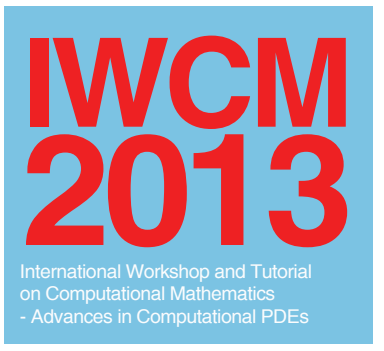
International Workshop and Tutorial on Computational Mathematics -Advances in Computational PDEs

March 25-28, 2013

Department of Computational Science and Engineering, Yonsei University



March 25 / 26 (Monday / Tuesday)

Tutorial on Finite Element Approximation of Eigenvalue Problems Arising from Partial Differential Equations

By **Daniele Boffi** (University of Pavia, Italy)

Description

This tutorial is devoted to the study of the finite element approximation of eigenvalue problems. In the case of Galerkin discretizations of elliptic partial differential equations, the conditions for the convergence of eigenvalues and eigenfunctions are the same as for the convergence of the solutions to the corresponding source problem. We review the basic arguments of the analysis which is often referred to as Babuska-Osborn theory. In the case of mixed formulations, however, it will be shown that standard conditions for the source problem (like the well-known Babuska-Brezzi inf-sup condition) are not suffcient in general for the good convergence of eigenvalues and eigenfunctions. Finally, we shall discuss the numerical approximation of eigenvalue problems in the setting of differential forms. This includes the study of the Hodge-Laplace eigenvalue problem in the framework of de Rham complex. The abstract theory is applied to the approximation of Maxwell's equations.

Schedule	Day1
10:00-11:30	Lecture 1
11:30-12:00	Discussion
12:00-13:00	Lunch break
13:00-14:30	Lecture 2
14:30-15:00	Discussion

Schedule	Day2
10:00-11:30	Lecture 3
11:30-12:00	Discussion
12:00-13:00	Lunch break
13:00-14:30	Lecture 4
14:30-15:00	Discussion

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Chang Ki-Won Seminar room (Yonsei-Samsung Library 7F), Yonsei University
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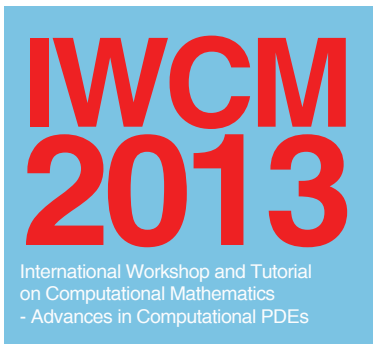

March 25 / 26 (Monday / Tuesday)

Tutorial (Daniele Boffi, University of Pavia, Italy) From 10 am to 3 pm with lunch break

March 27 (Wednesday)

Time	Program
08:30-09:00	**Registration**
09:00-09:10	**Opening** Jin Keun Seo
	Session I
09:10-10:00	**Arieh Iserles** (Cambridge University, UK) Computing the Schrodinger equation with no fear of commutators
10:00-10:50	**Dongwoo Sheen** (Seoul National University) A class of nonparametric DSSY(Douglas-Santos-Sheen-Ye) elements and a cheapest finite element method for the Stokes equations
10:50-11:20	**Coffee break**
11:20-12:10	**Daniele Boffi** (University of Pavia, Italy) The finite element immersed boundary method for the approximation of fluid-structure interaction problems
12:00-14:00	**Lunch break**
	Session II
14:00-14:50	**Martin Vohralik** (INRIA Paris-Rocquencourt, France) Adaptive inexact Newton methods with a posteriori stopping criteria for nonlinear diffusion PDEs
14:50-15:30	**Youngmok Jeon** (Ajou University) The hybridized numerical schemes for flow and elasticity problems
15:30-16:10	**Kwang-Yeon Kim** (Kangwon National University) Improved a posteriori error estimates for the Stokes equation
16:10-16:40	**Coffee break**
	Session III
16:40-17:20	**Thirupathi Gudi** (Indian Institute of Science, India) A posteriori error control of discontinuous Galerkin methods for elliptic obstacle problem
17:20-17:50	**Chunjae Park** (Konkuk University) P1-nonconforming divergence-free finite element method on square grids for incompressible Stokes equations
18:00-	**Banquet (Allen Hall)**

* Registration and all lectures will take place at Chang Ki-Won seminar room (Yonsei Library 7F).

March 28 (Thursday)

Time	Program
	Session IV
09:00-09:50	**Dongbin Xiu** (University of Utah, USA & CSE, Yonsei University) Multi-dimensional polynomial interpolation on arbitrary nodes
09:50-10:40	**Chang-Ock Lee** (KAIST) A dual iterative substructuring method with an optimized penalty parameter
10:40-11:10	**Coffee break**
11:10-12:00	**Carsten Carstensen** (Humboldt University of Berlin, Germany & CSE, Yonsei University) Guaranteed error control in CPDE
12:00-14:00	**Lunch break**
	Session V
14:00-14:50	**Jun Hu** (Peking University, China) Error estimates in the L^2 norm for finite elements of fourth order problems
14:50-15:30	**Hyea Hyun Kim** (Kyung Hee University) A staggered discontinuous Galerkin method for the Stokes system and its fast solvers
15:30-16:00	**Dongwook Shin** (Yonsei University) A hybrid discontinuous Galerkin method for convection-diffusion-reaction problems
16:00-16:30	**Coffee break**
	Session VI
16:30-17:10	**Neela Natraj** (IIT-Bombay, India) On a two-grid finite element scheme for the equations of motion arising in Kelvin-Voigt model
17:10-17:40	**Eun-Hee Park** (NIMS) A domain decomposition preconditioner for a discontinuous Galerkin method
17:40-18:10	**Eunjung Lee** (Yonsei University) FOSLL* for nonlinear partial differential equations