

Short Course on Introduction of Numerical Analysis for Partial Differential Equations

Feb. 13-17, 2012

R204, 2F, NCTS, NCKU

一、課程內容與目的：

為了培育更多科學計算研究人才，我們希望在南部地區也能開設一些相關基礎課程，提供給大學部高年級學生以及研究所碩博士研究生選修研習。我們將在2012年2月13~17日，開設「Short Course on Introduction of Numerical Analysis for Partial Differential Equations」，作為研究數值偏微分方程的基礎入門。此課程將由日本國立京都大學Yuusuke Iso (磯祐介)教授、Hiroshi Fujiwara (藤原宏志) 教授以及德島大學的Hitoshi Imai (今井仁司) 教授負責講授，另外，我們也會安排上機實驗與助教習題檢討。此短期課程的研習對象為：大學部高年級學生與研究所研究生，短期課程的研習預備知識包括：基礎微分方程與基礎數值分析。

Instruction about the Course:

by Yuusuke Iso

Numerical treatment of partial differential equations is one of the most important and interesting topics in the theory of numerical analysis, and it is important not only by a mathematical reason but by a practical reason to simulate many problems appeared in sciences and technologies.

We will read two different methods to approach partial differential equations in this short course; the finite difference method(FDM) and the spectral method(SM). The mathematical theory on stability and convergence is focused in the part of FDM, and accurate computation is discussed in the part of SM. Furthermore, we introduce multiple precision arithmetic which enables us to carry out more than 100 digits computation, and we show approaching ill-conditioned problems by the software 'exflib' of multiple-precision arithmetic. We explain how to install this software in the class, and we recommend you to bring your note PC, if you have, after Wednesday. Student should attack some problems including programming in exercise hours in order to understand the topics clearly.

We Japanese would like to thank our Taiwanese friends who have helped us at the huge disaster happened in the East Japan, and this intensive course of lectures is planned to express our sincere thanks through the academic contact between Taiwanese and Japanese mathematicians.

二、授課學者：

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National Center for Theoretical Sciences (South)

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三、課程內容與講題

日期	時間	主講人	講題
Feb. 13	13:00--14:00	Yuusuke Iso (磯祐介)	Finite Difference Methods 1
	14:15--15:15		Finite Difference Methods 2
	15:30--16:30		Finite Difference Methods 3
Feb. 14	10:30--11:30	Hitoshi Imai(今井仁司)	Spectral Method 1
	13:00--14:00	Exercise	Finite Difference Methods
Feb. 15	10:30--11:30	Hitoshi Imai(今井仁司)	Spectral Method 2
	13:00--14:00	Yuusuke Iso (磯祐介)	Finite Difference Methods 4
	14:15--15:15	Exercise	Spectral Method
	15:30--16:30	Hiroshi Fujiwara (藤原宏志)	Multiple Precision Arithmetic 1
	16:45--17:45	Exercise	Install of 'exflib'
Feb. 16	10:30--11:30	Exercise	Theoretical Parts
	13:00--14:00	Exercise	Programming
Feb. 17	10:30--11:30	Hiroshi Fujiwara (藤原宏志)	Multiple Precision Arithmetic 2
	13:00--14:00	Yuusuke Iso (磯祐介)	Finite Difference Methods 5
	14:15--15:15	Hiroshi Fujiwara (藤原宏志)	Multiple Precision Arithmetic 3
	15:30--16:30	Exercise	Programming