



DEPARTMENT OF APPLIED MATHEMATICS

① 用數學系

Seminar

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Topic

Some new algorithm developments on highly stiff stable schemes and on a SAV based approach for optimization problems

Date | Time

21 February 2024 (Wednesday) | 11:00am – 12:00pm (HK Time)

Venue

TU817, PolyU

Abstract

The talk will consist of two parts:

In the first part, I shall present a new way to construct highly stiff stable schemes. Traditional time discretization schemes are usually based on Taylor expansions at $t_{n+\beta}$ with $\beta\n [0,1]$. However, their ability to deal with very stiff problems are limited by their stability regions. Furthermore, their stability regions decrease as their order of accuracy increase. We show that by using Taylor expansion at $t_{n+\beta}$ with $\beta\1$ as a parameter, we can construct a new class of schemes whose stability region increases with $\beta\$, thus allowing us to choose $\beta\$ according to the stability and accuracy requirement. In addition, this approach enabled us to solve a long standing problem in the numerical approximation of Navier-Stokes equations: namely, construction and analysis of decoupled schemes with second- or higher-order pressure extrapolations.

In the second part, I shall briefly present several efficient algorithms based on the SAV approach for solving unconstrained minimization problems. These algorithms are usually more effective than GD based methods as they can be energy diminishing and can be used with arbitrarily large time steps/learning rates.

ALL ARE WELCOME