THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF APPLIED MATHEMATICS
應 用 數 學 系

The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

The energy technique for BDF methods

By

Prof. Georgios Akrivis
University of Ioannina

Abstract
The energy technique is probably the easiest way to establish stability of parabolic differential equations. The application of the energy technique to numerical methods with very good stability properties, such as algebraically stable Runge-Kutta methods or A-stable multistep methods, is straightforward. The extension to other numerical methods, such as A(ϑ)-stable methods, requires some effort and is more interesting; the main difficulty concerns suitable choices of test functions. Here we focus on the energy technique for backward difference formula (BDF) methods. In the cases of the A-stable one- and two-step BDF methods the application is trivial. The energy technique is applicable also to the A(ϑ)-stable three-, four- and five-step BDF methods via Nevanlinna-Odeh multipliers.

The main results are:
(1) No Nevanlinna-Odeh multipliers exist for the six-step BDF method.
(2) The energy technique is applicable under a relaxed condition on the multipliers.
(3) We present multipliers that make the energy technique applicable also to the six-step BDF method.

Bibliography
Professor Georgios Akrivis is a Full Professor at Department of Computer Science and Engineering, University of Ioannina, Greece. Professor Akrivis received PhD degree from University of Munich, Germany. He was an Assistant and Associate Professor at University of Crete, and he moved to University of Ioannina as Full Professor in 1995. Professor Akrivis' research interests include the numerical solution and analysis of linear and nonlinear evolutionary partial differential equations. He has published over 50 papers in journals like SIAM J. Numerical Analysis, Numerische Mathematik, and Mathematics of Computation. He is currently an Associate Editor of SIAM Journal on Numerical Analysis.

Date: 20 January, 2021 (Wednesday)
Time: 15:30-16:30 (Hong Kong Standard Time GMT +8)
Venue: Online Talk via Zoom (Meeting ID: 987 9993 7342)
Speaker: Prof. Georgios Akrivis, University of Ioannina
Host: Dr. Li Buyang, The Hong Kong Polytechnic University
Click to join: https://polyu.zoom.us/j/98799937342

Click to join (Zoom)

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

For enrolment, please send your name and email to chingching.lu@polyu.edu.hk on or before 19 Jan 2021