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

Superconvergence for discontinuous Galerkin time stepping

By

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Abstract

We describe a characteristic error profile for discontinuous Galerkin time stepping applied to an abstract parabolic PDE. Using piecewise polynomials of degree at most r - 1 in time, with $r \geq 1$, it is well know that the method is unconditionally stable and achieves an optimal convergence rate of order k^r, where k denotes the maximum time step. Moreover, if $r \geq 2$ then the right-hand limit of the DG solution at each break point can be superconvergent of order up to k^{2r-1}, depending on the regularity of the solution.

The error profile implies that the DG solution is also superconvergent of order k^{r+1} at the right Radau quadrature points in each subinterval. A simple postprocessing step then yields a *continuous* piecewise polynomial of degree at most $r \geq 2$ that achieves the optimal convergence rate k^{r+1} over the whole subinterval.

In the nonlocal, subdiffusive case we conjecture that this k^{r+1} rate reduces to $k^{r+\alpha}$ with $0 < \alpha < 1$.

Date: 24 August 2022 (Wednesday)
Time: 14:00-15:00 (Hong Kong Standard Time GMT +8)
Venue: Online Talk via Zoom (Meeting ID: 934 0218 2953)
Speaker: Prof. William Mclean, The University of New South Wales, Sydney
Host: Dr. Buyang Li, The Hong Kong Polytechnic University
Click to join:
https://polyu.zoom.us/j/93402182953?pwd=MFhPempUVG1CYTZ0ck8weW0wU0VKdz09

Click to join

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

For enrolment, please send your name and email to wai-yan.moon@polyu.edu.hk on or before 23 August 2022