THE UNIVERSITY   **OF HONG KONG**

Department of Mathematics

C O L L O Q U I U M

Ideas, Derivations and Global Error Analysis

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Abstract

Splitting methods have been used for solving a broad spectrum of scientific problems. They are designed for the numerical solutions to not only differential equations, but also statistical and optimization approximations. A splitting method decomposes an original problem to several subproblems, computes separately the solution of each of them, and then combines all sub-solutions to form an approximation of the solution to the original problem. A canonical example is splitting of diffusion and convection terms in a convection-diffusion partial differential equation. The splitting ideas simplify problems with multiple operators in natural ways. In all cases, the computational advantage is that it is faster to compute the solution of the split components separately, than to compute the solution directly when they are treated together. However, this comes at the cost of an error introduced by the splitting, so strategies must be devised for controlling the error. This talk studies splitting methods via operator computations. It also surveys recent developments in several areas. An interesting investigation is given in global error analysis of popular exponential splitting formulations. One recent development, adaptive splitting, deserves and receives a special mention in this talk: it is a new splitting method to collaborate with possible deep machine learning strategies. Senior undergraduate and all graduate students are welcome!

Speaker's information: Dr. Sheng received his BS and MS in Mathematics from Nanjing University in 1982, 1985, respectively. Then he acquired his Ph.D. from the University of Cambridge under the supervision of Professor Arieh Iserles. After his postdoctoral research with Professor Frank T. Smith, FRS, in University College London, he joined National University of Singapore in 1990. Since then, Dr. Sheng was on faculty of several American universities till his joining Baylor University, which is one of well-known research institutions and the second biggest private university in the USA.

Dr. Sheng has been interested in splitting and adaptive numerical methods for solving linear and nonlinear partial differential equations. He is also known for the Sheng-Suzuki theorem in numerical analysis. He has published over 112 refereed articles as well as several joint research monographs. He has been an Editor-in-Chief of the SCI journal, *International Journal of Computer Mathematics*, published by Taylor and Francis Group since 2010. He gives invited presentations, including keynote lectures, in international conferences every year. Dr. Sheng's projects have been supported by several research agencies. He currently advises 1 doctoral student and 2 postdoctoral research fellows. He also has 3 visiting scholars from China this year.

Date:	**October 25, 2019 (Friday)**
Time:	**4:30 – 5:30pm**
Venue:	**Room 210, Run Run Shaw Bldg., HKU**

All are welcome