香 港 浸 會 大 學
HONG KONG BAPTIST UNIVERSITY

JRIAM & ICM
Colloquium

Fast Gradient Descent, Artificial Time Integration, and Applications to Image and Surface Reconstruction

Speaker : Prof. Uri Ascher
Department of Computer Science
University of British Columbia
Canada

Date : 22 May 2009 (Friday)

Time : 11:30 a.m. - 12:30 p.m.

Venue : FSC1217, Fong Shu Chuen Library
HSH Campus
Hong Kong Baptist University

Abstract:

The integration to steady state of many initial value ODEs and PDEs using the forward Euler method can alternatively be considered as gradient descent for an associated minimization problem. Greedy algorithms such as steepest descent for determining the step size are as slow to reach steady state as is forward Euler integration with the best uniform step size. But other, much faster methods using bolder step size selection exist. Various alternatives are investigated from both theoretical and practical points of view.

The steepest descent method is also known for the regularizing or smoothing effect that the first few steps have for certain inverse problems, amounting to a finite time regularization. We further investigate the retention of this property using the faster gradient descent variants in the contexts of deblurring and denoising of images, and of shape optimization involving data inversion of elliptic PDEs. When the combination of regularization and accuracy demands more than a dozen or so steepest descent steps, the alternatives offer an advantage, even though (indeed because) the absolute stability limit of forward Euler is carefully yet severely violated.

Organizers:
Joint Research Institute for Applied Mathematics (JRIAM)
Institute for Computational Mathematics (ICM)

- All interested are welcome -
For further information, please visit **http://www.math.hkbu.edu.hk/**, or call 34115056.