DEPARTMENT OF MATHEMATICS
THE CHINESE UNIVERSITY OF HONG KONG

Center for Mathematical Artificial Intelligence
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MATH-IMS Joint Applied Mathematics Colloquium Series
The Chinese University of Hong Kong

This MATH-IMS Joint Colloquium Series is organized by Center for Mathematical Artificial Intelligence (CMAI), under Department of Mathematics and Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The colloquium series focuses on mathematics and applications of artificial intelligence, big data and related topics.

Date: March 11, 2022 (Friday)
Time: 17:00-18:00 (Hong Kong Time)
Zoom Link: https://cuhk.zoom.us/j/92775210812

A dynamical system perspective of optimization in data science

Speaker: Professor Jalal Fadili
ENSI Caen

Abstract: In this talk, I will discuss and introduce deep insight from the dynamical system perspective to understand the convergence guarantees of first-order algorithms involving inertial features for convex optimization in a Hilbert space setting. Such algorithms are widely popular in various areas of data science (data processing, machine learning, inverse problems, etc.). They can be viewed discrete as time versions of an inertial second-order dynamical system involving different types of dampings (viscous damping, Hessian-driven geometric damping). The dynamical system perspective offers not only a powerful way to understand the geometry underlying the dynamic, but also offers a versatile framework to obtain fast, scalable and new algorithms enjoying nice convergence guarantees (including fast rates). In addition, this framework encompasses known algorithms and dynamics such as the Nesterov-type accelerated gradient methods, and the introduction of time scale factors makes it possible to further accelerate these algorithms. The framework is versatile enough to handle non-smooth and non-convex objectives that are ubiquitous in various applications.

Bio: Professor Jalal Fadili is a full professor at Ecole National Supérieure d'Ingénieurs de Caen. He is also serving as the Director of GdR MIA (Mathematics of Imaging and Applications). He holds several scientific management positions (editorial activities, national excellence research networks). He has also held visiting positions at several universities (QUT-Australia, Stanford, Cal- Tech, EPFL-Switzerland, MIT). Professor Fadili received his Ph.D. in image and signal processing at University of Caen in 1999. He specializes in mathematical signal and image processing, mathematical statistics, inverse problems, variational methods and regularization theory, and non-smooth optimization. His areas of application include medical and astronomical imaging. In the last decade, he has been an invited or plenary speaker at various international events. He has published more than 170 papers in the leading journals and conferences of these fields.