



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: June 30, 2023 (Friday)

Time: 15:00-16:00 (Hong Kong Time)

Zoom Link: <https://cuhk.zoom.us/j/92775210812>

Four episodes of Kuramoto oscillators

Speaker: Professor Seung Yeal Ha,

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Abstract: In this talk, we discuss the state-of-the-art results on the emergent behaviors of the Kuramoto oscillators. In particular, we study relations between the finiteness of collisions and phase-locking of the Kuramoto model. When there is no inertial effect, it is well known that the finiteness of collisions is equivalent to the emergence of phase-locking. Thus, when a Kuramoto ensemble is under the effect of inertia, whether the same equivalence relation hold or not is an intricate question. In this talk, we show that in a small inertia regime, the aforementioned equivalence still holds, whereas in a large inertia regime, we show that a homogeneous Kuramoto ensemble with the same natural frequencies can exhibit phase-locking, while there are countable number of collisions between Kuramoto oscillators. This is a contrasted effect of a large inertia in phase-locking process. This is a joint work with Hangjun Cho (SNU) and Jiu-Gang Dong (Dalian Univ. of Technology).

Bio: Prof. Ha is currently a Professor at Department of Mathematical Sciences, Seoul National University. He received his Ph.D. at Stanford University in 2001, was Van Vleck Assistant Professor at University of Wisconsin at Madison from 2001-2003, then joined Seoul National University in 2006 and has been a Professor since 2011. His research interests lie in applied analysis, collective dynamics, hyperbolic conservation laws and kinetic theory. Prof. Ha is a leading expert in those fields and has supervised a large group of successful students who are now assistant or associate professors around the world. Besides, he has received many honors and awards, e.g., he gave the Keynote lecture at 32nd International Symposium on Rarefied Gas Dynamics, gave a plenary talk at International Conference on Hyperbolic Problems in Brazil, 2014, was awarded 17th Korea Science Prize, has been Member of The Korean Academy of Science and Technology. He has published more than 300 journal papers and is the Editor in Chief for Networks and Heterogeneous Media, and on editorial board for many prestigious journals such as Bulletin of the Korean Mathematical Society, Kinetic and Related Models, etc.