埼玉大学研究機構テニュアトラック第２回シンポジウム

Modern Harmonic Analysis and Applications

Date/ 30 October 2014 (Thursday) 13:30-17:35

Venue/ School of Science Building 1, 3F, Room No.1337

（理学部1号館３階　基礎数理演習室）

Program :

Chairman:	Takeyuki Nagasawa (Professor of Saitama University)
13:30-13:35	**Welcome Address**
By	Yuichi Sato (Director-General, Research and Development Bureau)
13:40-14:25	Harmonic analysis: from heat flow to data compression
By	Neal Bez (Tenure-track Associate Professor of Saitama University)
14:30-15:15	Convergence of Fourier series and integrals
By	Sanghyuk Lee (Professor of Seoul National University)
15:15-16:00	**Coffee Break**
16:00-16:45	Improvement of Hölder's inequality
By	Tohru Ozawa (Professor of Waseda University)
16:50-17:35	A calculus for oscillatory integrals
By	James Wright (Professor of University of Edinburgh and Fellow of the Royal Society of Edinburgh)

Abstract:

This symposium will showcase modern Harmonic Analysis and its numerous applications, within mathematics, across the sciences, and in our everyday lives.

Harmonic Analysis is a field of mathematics which extends Fourier Analysis, named after the famous French mathematician, Jean Baptiste Joseph Fourier, who published his famous treatise on the theory of the flow of heat around 1800. In this work, Fourier proposed his law for the diffusion of heat and solving this led to the staggering notion that most functions are describable as infinite sums of sine and cosine waves of varying frequencies, and thus to Fourier series and the Fourier transform.

This brilliant idea has since led to a plethora of applications, not only in mathematics and physics where its roots can be found, but across a fascinatingly broad range of fields. One eye-catching application is the revolutionary impact of Fourier Analysis on the music and sound technology industry, for example, in the design of electronic music synthesizers and electronic keyboard instruments. An even more recent application is the use of Fourier Analysis to dramatically reduce the size of electronic audio files into the widely used MP3 format which allows music files to be freely shared across the internet without sacrificing the original quality of the sound.

Within pure mathematics, much of the modern research activity in Harmonic Analysis is fuelled by the wealth of connections to other highly active mathematical fields. One startling connection is with the so-called Kakeya Conjecture from Geometry, which began in 1917 when the Japanese mathematician Soichi Kakeya asked the innocuous sounding question of finding the minimum area required to turn a line segment with length one through 180 degrees in the plane.

The main purpose of this symposium will be to present a selection of these developments from internationally renowned mathematicians for which Harmonic Analysis is a key aspect of their research.
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