Tropical Linear Algebra and Its Applications

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Date : 4 April 2013 (Thursday)
Time : 4.30pm – 5.30pm
Venue : SPMS – LT3, SPMS-03-02
School of Physical and Mathematical Sciences

Tropical algebra (sometimes called max algebra) is the set of real numbers with additional symbol, −∞, with unusual way to define the operations, namely, the sum of two elements is their maximum, and the product is their sum. Under these operations tropical algebra is an algebraic structure called a semiring. Note that there is no subtraction in this semiring, however addition and multiplication are commutative, associative, and satisfy usual distributivity laws. The other typical examples of semirings are non-negative integers, non-negative reals, boolean algebras. Tropical algebra naturally appears in modern scheduling theory, game theory and optimization. Tropical arithmetic allows to reduce difficult non-linear problems to the linear problems but over tropical algebra. Therefore, to investigate these problems it is necessary to develop linear algebra in the tropical case. The main purpose of our talk is to discuss tropical linear algebra and different its applications.

We plan to consider the modern progress in the theory including our recent results. Among the other topics we shall discuss our recent joint research results with Marianne Akian, LeRoy Beasley, Stephane Gaubert, and Yaroslav Shitov.

Speaker Biography

Professor Alexander Guterman was born in 1975 in Moscow, Russia. He received his Ph.D. (Candidate of Science) degree in 2001 and a habilitation (Doctor of Science) in 2009 from Moscow State University, where he is working as a full professor at the Department of Mechanics and Mathematics. His research interests are mostly in Linear Algebra and its applications. His work has been supported by a number of research grants in Russia and abroad. In 2005, he received a prize of Academia Europaea for young Russian scholars. Alexander Guterman is a member of Moscow Mathematical Society and International Linear Algebra Society. He delivered invited talks at many international conferences in his research area. He held appointments as a visiting professor at numerous universities including Ecole Polytechnique (Paris), Stockholm University, University of Lisbon, University Colledge Dublin and University of Manchester. He published more than 60 research papers in well-known professional journals and is a member of the editorial board of the Journal “Fundamental and Applied Mathematics”.

Host: Prof. Edith Elkind, Division of Mathematical Sciences, School of Physical and Mathematical Sciences