

## Program and Abstract

Date: February 18, 2019

Venue: Meeting Room 1102, 11th floor, Bldg. 26, Waseda Campus

14:00 – 14:10 Opening address

14:10 – 15:10 **Title:** On Rational Solutions of Discrete Integrable Systems  
Da-jun Zhang (Shanghai University)

**Abstract:** Hirota-Miwa equation (also known as Hirota's equation/discrete AKP equation) is one of general 3D discrete integrable equations. Tau function of this equation admits an algebraic form, composed by polynomials of discrete independent coordinates. In this talk I will discuss properties of such a tau function and its applications in constructing rational solutions of integrable quadrilateral equations (such as the Nijhoff-Quispel-Capel equation, equations in the Adler-Bobenko-Suris (ABS) list and some multi-quadratic ABS equations). The tau function obeys a bilinear superposition formula, which provides generalized Burchnell-Chaundy polynomials.

15:10 – 16:10 **Title:** Aspects of Boundary Problems for Discrete Integrable Systems  
Cheng Zhang (Shanghai University)

**Abstract:** In this talk, I will report some work related to boundary problems for quad-graph integrable systems. Quad-graph systems are two-dimensional discrete equations defined on quadrilaterals and the corresponding integrable criterion is the multi-dimensional consistency. The first part of the talk will focus on the construction of boundary problems for quad-graph integrable systems. Precisely, boundary of quad-graph systems is characterized by relations defined on triangular configurations, and the corresponding integrable criterion is referred to as boundary consistency that are compatibility conditions defined on half of a rhombic dodecahedron. Solutions of the boundary consistency are naturally interpreted as discrete integrable boundary conditions. In the second part of this talk, using a factorization technique, discrete integrable boundary conditions for multi-dimensional-consistent equations from the ABS classification can be derived. As a direct application, reduction of lattice equation on a finite interval in the presence of integrable boundaries can be constructed. This amounts to classes of integrable maps.

16:10 – 16:30 Tea break & discussion

16:30 – 17:30 **Title:** A Space-time Spectral Method for Third-order Differential Equations  
Hua Wu (Shanghai University)

**Abstract:** In this talk, we will discuss the numerical schemes for third-order differential equations based on Legendre-Petrov-Galerkin spectral method for the spatial direction and the Legendre-tau method for temporal direction. The stability and convergence analysis for the space-time spectral method is given. Some numerical experiments are carried out to verify the effectivity of our methods.

18:00 – Reception

Organized by Linyu Peng

Supported by Waseda Institute for Advanced Study and Top Global University Project, Waseda University