Research Report 2015

Publications

1. Isomonodromy aspects of the tt* equations of Cecotti and Vafa I. Stokes data,
with A. R. Its, and C.-S. Lin, Int. Math. Res. Notices 2015 (2015) 11745-11784.
2. Isomonodromy aspects of the tt* equations of Cecotti and Vafa II. Riemann-Hilbert problem,
with A. R. Its, and C.-S. Lin, Commun. Math. Phys. 336 (2015) 337-380

Talks

1. Painleve III, old and new
TIMS-OCAMI-WASEDA International workshop on Painleve equations and related topics
National Taiwan University (Taipei)
2015.5.10

2. 微分方程式、群と幾何学
早稲田大学
談話会
2015.5.28
(in Japanese)

3. Solutions of the tt*-Toda equations: a complete picture
Australia and Japan workshop: Geometry, Analysis, and their Applications
University of Adelaide (Australia)
2015.10.21

4. From Painleve to CFT
Koriyama Geometry and Physics Days
Nihon University (Koriyama)
2016.2.8

5. Convexity for a certain space of solutions of the Hitchin equations
OCAMI-KOBE-WASEDA Joint International Workshop on Differential Geometry and Integrable Systems
Osaka City University
2016.2.13

6. Convexity for a certain space of solutions of the Hitchin equations
Geometry Seminar
Mannheim University (Germany)
2016.3.11

Conference Organized

1. TIMS-OCAMI-WASEDA International workshop on Painleve equations and related topics
10-13 May 2015, National Taiwan University

2. UK-Japan Winter School on Classic and Stochastic Geometric Mechanics 4-7 January
2016, Imperial College London, UK.

3. Koriyama Geometry and Physics Days 6-8 February 2016, Nihon University (Koriyama,
Fukushima). Study meeting on the theme: "Painleve equations, integrable systems and
moduli spaces"

4. OCAMI-KOBE-WASEDA Joint International Workshop on Differential Geometry and
Integrable Systems 13-17 February 2016, Osaka City University and Kobe University

Research Summary
I have studied the tt*-Toda equations, by combining three methods: partial differential
equations, the Riemann-Hilbert method, and infinite-dimensional Lie theory (loop
groups).   This a nonlinear p.d.e. which is important in geometry (harmonic maps) and
supersymmetric quantum field theory (quantum cohomology).   In joint work with Alexander
Its (IUPUI, USA) and Chang-Shou Lin (National Taiwan University, Taiwan) we have solved
these equations on the punctured complex plane and given parametrizations of the
solutions using asymptotic data, monodromy data, and holomorphic data
(Weierstrass/DPW data).