

## Research report 2017

### Publications

Guest, Martin A.; Hertling, C.;  
Painleve III: a case study in the geometry of meromorphic connections,  
Lecture Notes in Mathematics 2198, Springer, 2017 (ix+202 pages)

### Talks

2017/9 "The  $tt^*$ -Toda equations" University of Toronto (Canada), talk at Symplectic Geometry Seminar

2017/4 "On the monodromy data of the  $tt^*$ -Toda equations" CIRM, Luminy (France), talk at Workshop on Hodge Theory, Stokes Phenomenon and Applications

2017/1 "The  $tt^*$ -Toda equations: geometry, string theory and analysis" University of Hannover (Germany), Colloquium talk

2016/7 "Convexity for a certain space of solutions to the Hitchin equations" University of Durham (UK), talk at LMS-EP SRC Durham Symposium on Geometric and Algebraic Aspects of Integrability

2016/5 "Harmonic maps of Painleve-type: the loop group point of view"  
National Taiwan University, Taipei (Taiwan), talk at Workshop on Flat connections, Higgs bundles and Painleve equations

### Conferences co-organized

1st Japan-Taiwan Conference on Differential Geometry & 8th OCAMI-TIMS Joint International Workshop on Differential Geometry and Geometric Analysis 13-17 December 2016, Waseda University

String Theory Meeting in the Greater Tokyo Area (SiGT), 28-29 November 2016 at Waseda University and 1-2 December 2016 at Tokyo Metropolitan University

Flat connections, Higgs bundles and Painleve equations 1-5 May 2016, TIMS, National Taiwan University

### Research summary

I am studying Lie-theoretic and symplectic properties of moduli spaces of solutions of the  $tt^*$ -Toda equations. 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).