Name: SAKAI Hidetaka
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Current Research

My research interest is in the theory of differential equations and discrete equations on complex domains. In particular I am studying special functions, which are defined as the solutions of some integrable dynamical systems. I would like to extend the object of methodes and ideas as used in the study of elliptic functions or hypergeometric functions to the area of non-linear ordinaly and partial differential equations, or discrete equations.

When we work out in detail, we would encounter some sources of problems, such as 1. symmetries of equations, 2. structures of particular solutions, 3. structures of analytic continuations of solutions, 4. irreducibility problem, which shows that solutions can't be expressed by known functions. We also aim to obtain 5. concrete expressions of solutions when it is possible. Aside from property of functions themselves, 6. classifications of equations is also important and interesting. It would provide the area which is suitable for extension of the ideas.

As I mention my results, I obtained a characterization of the Painlevé equations from the view point of algebraic geometry. With respct to the Painlevé equations and their descretizations, higher dimensional extensions, we can construct a geometrical object which is called the space of initial conditions. We obtain various knowledge through the geometrical investigation.

Prerequistes

Knowledge of complex analysis, differential equations on complex domains would help your study in this region.

Algebraic geometry, representation theory of ininite dimensional Lie algebras would be also efficient in some scenes.