Research Report（April, 2020- March, 2021）

Enrollment from April 2017   Department of Pure Mathematics and Applied Mathematics   Yoshiki KANEKO

I. List of Papers

Yoshiki Kaneko, "Solutions of the tt*-Toda equations and quantum cohomology of flag manifolds", (submitting)

II. List of Talks

1, Yoshiki Kaneko "Solutions of the tt*-Toda Equations and Quantum Cohomology of Flag Manifolds", Internationla Workshop on Multiphase Flows: Analysis, Modeling and Mechanics, online, 12/1~12/4 2020

2, Yoshiki Kaneko "Solutions of the tt*-Toda equations and quantum cohomology of flag manifolds", Mathematical Society of Japan Spring Meeting 2021 online, 3/15~3/19 2021.

III. Research Results in AY2020

It was claimed that from the quantum cohomology of CP^n we have a global solution of the tt*-Toda eqations by Cecotti and Vafa. From this claim, M. Guest and other researchers showed that we have the tt*-Toda equation by using the DPW method from the DPW potential including the Dubrovin connection from quantum cohomology. In 2019, I proved that the homogeneous spaces which come from minuscule weights correspond to a local solution of the tt*-Toda equations. In this time, I proved them by each Lie group type. In 2020, I showed simultaneously them by using the conditions of minuscule weights. In type A, it is known that the quantum Satake isomorphism which says that the wedge product of the quantum cohomology of CP^{n} is isomorphic to the quantum cohomology of Grassmannian. I showed the Satake isomorphism in type D. Now I have submitted them.

IV. Research Plan for AY2021

Homogeneous spaces from the minuscule weights correspond to solutions whose asymptotic data correspond to the origin of the fundamental Weyl alcove (FWA). In next year, I will consider the line through the origin and x_{0} in FWA. This x_{0} is introduced by Kostant and the cross sections are studied well. Thus I observe that line in this context. As another topic, it is important in physics that the map for the parameter space takes integer values. Hence I will observe that the inverse of these points and I will consider Lie theoretic meanings.