



The Hong Kong University of Science and Technology

Department of Mathematics

MPhil THESIS EXAMINATION

***Moduli Spaces of Local Systems and the Polynomiality
Conjecture***

By

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ABSTRACT

Fock–Goncharov constructed moduli spaces of G -local systems on decorated surfaces for split semi-simple algebraic groups G , which carries positive structures and generalizes the usual Teichmüller space. They showed that their coordinate rings carry cluster algebra structures when G is of type A , which enables the use of cluster algebra techniques in studying these spaces. For general G , this was completed by Goncharov–Shen. Using the cluster structure, Goncharov–Shen defined cluster Donaldson–Thomas transformations on general cluster varieties. They conjectured, then proved that the \mathcal{P} moduli space has a cluster Donaldson–Thomas transformation. Meanwhile, it is known that the quantum group can be embedded into the corresponding quantum cluster algebras, and it was conjectured by Ip that the image of the Chevalley generators are polynomials in the cluster variables for any cluster in the mutation class of the quantum cluster algebra. The goal of this thesis is to provide another proof to the first conjecture and prove the second conjecture.

Date : 10 May 2023, Wednesday

Time : 2:00 p.m.

Venue : Room 3494 (Lifts 25/26)

Thesis Examination Committee

Chairman : Prof. Yongchang ZHU, MATH /HKUST

Thesis Supervisor : Prof. Ivan Chi Ho IP, MATH/HKUST

Member : Prof. Eric Paul MARBERG, MATH/HKUST

(Open to all faculty and students)

The student's thesis is now being displayed on the reception counter in the General Administration Office (Room 3461).