



The Hong Kong University of Science and Technology

Department of Mathematics

MPhil THESIS EXAMINATION

On the Conifold Point in Topological String Theory

By

Mr. Lei YOU

ABSTRACT

This thesis reviews the role of the conifold point in topological string theory, focusing on its significance in enumerative geometry of Calabi-Yau threefolds. We provide an overview of the topological A-string and B-string, covering some basic mathematical structures such as cohomological field theories and Gromov-Witten invariants. The conifold singularity is explored in geometric transitions, with emphasis on the large N duality linking Chern-Simons theory on S^3 to the resolved conifold. A central topic is the conifold gap conjecture, which predicts a universal gap structure in the higher-genus B-model amplitudes near the conifold point. This structure provides critical conditions to determine higher-genus Gromov-Witten invariants of Calabi-Yau threefolds. We also survey some gap structures in other situations.

Date : 4 July 2025, Friday

Time : 3:00 pm

Venue : Room 2463 (Lifts 25-26)

Thesis Examination Committee

Chairman : Prof. Qingyuan JIANG, MATH /HKUST

**Thesis Supervisor : Prof. Huai-Liang CHANG, MATH/HKUST
(via online)**

Member : Prof. Tsz-Ho FONG, 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).