The Hong Kong University of Science and Technology

Department of Mathematics

MPhil THESIS EXAMINATION

A Simple Converging Embedding Method for the Laplace-Beltrami Operator on Implicit Surfaces

By

Mr. Young Kyu LEE

ABSTRACT

We propose a simple embedding method for computing the eigenvalues and eigenfunctions of the Laplace-Beltrami operator on implicit surfaces. The approach follows an embedding approach for solving the surface eikonal equation. We replace the differential operator on the interface with a typical Cartesian differential operator in the surface neighborhood and an extension operator on an outer layer of the computational tube. To observe a numerical convergence as the underlying mesh size approaches zero, we study different choices of the tube radius in the form of $O(\Delta x^{\gamma})$ for $\gamma \in [0,1]$. Our proposed algorithm is easy to implement and efficient. We will give some two- and three-dimensional numerical examples to demonstrate the effectiveness of our proposed approach.

Date : 3 August 2022, Wednesday

Time : 02:00 p.m.

Venue : Online via ZOOM

ID: 932 5399 1486 (Passcode: 501724)

https://hkust.zoom.us/j/93253991486

Thesis Examination Committee

Chairman	**:**	**Prof. Yang XIANG, MATH /HKUST**
Thesis Supervisor	**:**	**Prof. Shing Yu LEUNG, MATH/HKUST**
Member	**:**	**Prof. Xiaoping WANG, 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).