



Amendment

The Hong Kong University of Science and Technology

Department of Mathematics

MPhil THESIS EXAMINATION

***An Adjoint State Method for an Inverse Problem
for the Schrödinger Equation***

By

Miss Siyang WEI

ABSTRACT

In this thesis, we propose a simple algorithm for solving an inverse problem for the Schrödinger equation. The idea is to apply the gradient descent and the adjoint state technique. We observe that since the forward operator is self-adjoint, the approach simply requires to solve the same partial differential equation for both the forward problem and the adjoint problem. To speed up the computations, we also develop a cascading initialization strategy to provide a better initial condition for the inversion process. To be more realistic for real life applications, we incorporate techniques from the level set method to handle cases with only a set of finite number of Dirichlet-to-Neumann (DN) measurements. Moreover, based on a usual reduction, this inverse problem can be linked to the standard Calderón inverse problem for the electrical impedance tomography (EIT). Therefore, our approach might provide a simple numerical alternative to solve the EIT problem. Numerical examples will demonstrate that the new formulation is effective and robust.

Date : **22 July 2019, Monday**
Time : **10:00 a.m.**
Venue : **Room 3494 (near lifts 25-26)**
Thesis : **Prof. Jianfeng CAI (Chairman)**
Examination : **Prof. Shing Yu LEUNG (Supervisor)**
Committee : **Prof. Hai ZHANG**

(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).