

## Vita

Candidate's name: Derrick Glen Kirby

Universities  
Attended: University of New Brunswick (2018)  
Bachelors of Science Honours

University of New Brunswick (2022)  
Masters of Science

# Solving an Analyzing Partial Differential Equations Using the Laplace Transform

UNIVERSITY OF NEW BRUNSWICK

THESIS DEFENCE AND EXAMINATION

in Partial Fulfillment

of the Requirement for the Degree of  
Master of Science

by

**Derrick G. Kirby**

in the Department of Mathematics & Statistics

U.N.B., Fredericton, N.B.

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via MS TEAMS

Examining Committee

Dr. Sanjeev Seahra  
Dr. Viqar Husain  
Dr. Abdelhaq Hamza  
Dr. Tariq Hasan

Supervisor  
Internal Examiner  
External Examiner  
Chair of Oral Examination

## Abstract

Given a partial differential equation in two variables, it is possible to derive whether the solutions to said differential equation exhibit exponential unboundedness. In order to determine this, one may find the Laplace transform of the solution — which may be easier to find than the solution itself — and then find the singularities of the analytic continuation of this transform. If any of the singularities have positive real part, there will exist an instability for generic initial conditions.

This thesis is dedicated to deriving an algorithm to find the Laplace transforms of solutions to partial differential equations of

arbitrary order with constant coefficients. This algorithm allows for the question of boundedness of solutions to a particular class of partial differential equations to be reduced to the question of invertibility of an infinite-dimensional matrix.