

The University of Derby  
**Faculty of Arts, Design and Technology**

# Efficient Acoustic Modelling of Large Spaces using Time Domain Methods

Analysis of Time Domain Numerical Methods  
for Acoustic Modelling of Large Spaces

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Submitted for in part-fulfilment of the requirements for the  
MSc in Audio Engineering.



*for Bethany*



## **Acknowledgements**

I would like to dedicate this work to anyone of remote importance.



## Contents





## Acronyms

Use the template *acronym.tex* together with the Springer document class `SVMono` (monograph-type books) or `SVMult` (edited books) to style your list(s) of abbreviations or symbols in the Springer layout.

Lists of abbreviations, symbols and the like are easily formatted with the help of the Springer-enhanced `description` environment.

ABC	Spelled-out abbreviation and definition
BABI	Spelled-out abbreviation and definition
CABR	Spelled-out abbreviation and definition



# Chapter 1

## Introduction

The intro Text

### 1.1 Context

### 1.2 Problem Definition

Real time acoustic modelling could be of significant benefit to many applications; Engineers could make design changes and see results 'on the fly', and entertainment users could have more realistic experiences. These benefits should be possible for an arbitrary number of sources and receivers, in proportionally large environments with high quality results. Is it possible to further reduce computation time for simulations of large acoustic problems, to provide results in real time for the full human audio frequency range? There are two 'branches' of computation solution that should be considered: the direct solution i.e. direct outputs or audio samples from the simulation, and indirect solutions i.e. a system impulse response that may be convolved with mixed source signals in order to create an auralization of the system.//

**Fig. 1.1** A visualisation of a 2D explicit FDTD simulation [?]