Final report on Graduate seminar

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1 Talk Title

Introduction of Multigrid

2 Abstract

In this talk, I gave a brief introduction for the concept of multigrid framework, based on solving PDE equations.

3 Introduction

The idea of multigrid is motivated by solving PEDs numerically based on equivalently meshed grids. The overall goal is trying to save computational cost by put more effort on the coarse level rather than only on a single fine level but still reach the same accuracy as being solved on the fine grid. To make this success, we need first formalize the problem separately on different levels and construct the communication tools between different levels. Finally we can get the convergence rate of multigrid independent of mesh size.

Multigrid has been proven on a wide variety of problems, especially elliptic PDEs, but has also found application among parabolic hyperbolic PDEs, integral equations, evolution problems, geodesic problems, etc. And now more and more people get interest on how to utilize this idea to optimization-based methods.

4 List of seminars I have attended this semester

- Sept. 23 Carson Chow: The dynamics of obesity
- Sept 30 Andrei Draganescu: Multigrid preconditioners for linear systems arising in PDE optimization

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- Oct.7 Zach Trautt Grain Boundary Properties From Atomistic Simulations
- Oct. 21 Nick Gewecke Dynamics of Mushy Layers
- Nov. 11 John Mallet-Paret Recent Progress in Delay-Differential Equations