San Diego State University

Department of Mathematics and Statistics
Math 693b
Advanced Numerical Analysis

SAN DIEGO STATE UNIVERSITY

Project Proposal: The KdV Equation

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April 8^{th}, 2018

Contents

1 Introduction 1

2 Background and Motivation 1

3 Presented Work 1

4 Bibliography 2

1 Introduction

The KdV equation is a nonlinear PDE that describes waves on shallow water surfaces. It is of interest to the course since it can be used to illustrate the application of pseudospectral methods and the Fast Fourier Transform (FFT) algorithm both in Matlab and Python. The equation comes in many forms, one of which is

$$u_t = u_{xxx} + uu_x,$$

where u is a function that represents the fluid's velocity.

2 Background and Motivation

Motivation for this project is to explore a method that, as of the moment of this writing, has not been covered in the lectures, and that would also be applicable to fluid dynamics, which is the main focus of my research activity at this stage. Moreover, it provides the opportunity to browse for resources and gain skills that might be very useful for future work connected to my research interests.

3 Presented Work

At this stage, I am not prepared to discuss the details of what the project is going to cover. However, the goal will be to ultimately use pseudospectral methods to solve the KdV equation and analyze the methods' features, advantages and disadvantages. Ideally, to also briefly discuss the issue of aliasing and how to implement simple filtering techniques to solve it.

4 Bibliography

References

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