

MULTISCALE MODELING OF DIFFUSION PROCESSES IN THE BRAIN

by

Fredrik E Pettersen
f.e.pettersen@fys.uio.no

THESIS
for the degree of
MASTER OF SCIENCE



Faculty of Mathematics and Natural Sciences
University of Oslo

June 2013

Abstract

This is an abstract text.

To someone

This is a dedication to my cat.

Acknowledgements

I acknowledge my acknowledgements.

Contents

1	The beginning is here	5
---	-----------------------	---

List of Figures

List of Tables

Chapter 1

The beginning is here

Start your chapter by writing something smart. Then go get coffee.

The very first approach was to simply try the problem on a bit. That is to try and substitute some small part of the mesh in a Finite Difference Diffusion solver (Forward Euler scheme) with a stochastic diffusion solver. A random walk method was implemented on part of the mesh to take over the equation-solving. This was done in 1 and 2 spatial dimensions with the aim of finding potential difficulties so that we can further investigate them.

Upon switching length-scales a fundamental question arises almost immediately; what is the continuum limit? In our case this question takes a slightly different, and possibly more answerable form; what is the conversion rate between the continuum model and the microscopic model, and by extension, what does a walker correspond to? The first instinct of this candidate was to just try some conversion rate (say some value corresponds to some number of walkers), and this was implemented in both 1 and 2 dimensions.