

TABLE OF CONTENTS

	Signature Page	iii
	List of Figures	vi
	List of Tables	viii
	Dedication	viii
	Acknowledgements	x
	Abstract	xi
Edit by 4/19	Chapter 1	
	Introduction	1
	1.1 Fluid momentum equations	2
	1.2 Boundary integral equation (BIE) formulations	3
4/14-15	1.3 Non-Newtonian fluid	4
edit by 4/26	Chapter 2	
	Settling marine aggregates in a homogeneous fluid	5
	2.1 Aggregate model	5
	2.2 Elimination of single- and double-layer potentials	6
	2.2.1 Derivation of single-layer potential	6
	2.2.2 Derivation of double-layer potential	8
	2.3 Non-dimensionalization	11
	2.4 Numerical methods	12
	2.4.1 Linear system	12
	2.4.2 BIE formulations comparison	13
	2.4.3 Validation: Streamlines	17
	2.5 Hydrodynamic forces: Drag, Torque, and Straining force	17
by 4/21	2.6 Concentration dynamics	20
	2.6.1 Frame of reference	22
	2.6.2 Simulations	23
	Chapter 3	
	Settling marine aggregates in a stratified fluid	27
	3.1 Governing Equations	28
	3.1.1 Particular solution to Stokes equations with the strati- fication	29
	3.1.2 Force balance	30
	3.1.3 Advection-Diffusion equation	31
by 5/1	3.2 Non-dimensionalization	31
	3.3 Rotation	33
5/2 - 5/3	3.3.1 Rotation matrix	35
	3.3.2 Solve for stress	35
	3.3.3 Velocity field	37
	3.3.4 Update perturbation	38
	3.3.5 Validations	39

Spacial convergence with varying (dx, dx/2, dx/4) , different domain size (smaller domains)
time convergence -
use just 10 cubes

All chapter 3 send by 5/24

For 50 cubes, clean up the figures that I have now
by 5/10

SEND 3.4 BY 5/17

4.1 - 4.2 : needs
edit by 5/31

by 6/2 (add text)

3.4	Numerical methods	42
3.4.1	Background fluid density	42
3.4.2	Velocity computation	45
3.4.3	FMM3D library	48
3.4.4	Homogeneous velocity computation with FMM	50
3.4.5	Computation time results	57
3.5	Numerical simulation results	60
3.6	Discussions	60
Chapter 4	Continuum modeling of a complex fluid with a second order fluid	61
4.1	Governing equations	62
4.1.1	Rheology	63
4.1.2	Viscosity regularization	65
4.2	Numerical methods	65
4.2.1	Computation of pressure dependent apparent viscosity	66
4.2.2	Second-order strain rate stress tensor	66
4.2.3	Velocity computation	68
4.3	Predictor-Corrector method	69
4.4	Validation	70
4.5	Example	70
Chapter 5	Conclusion	71
Bibliography	71
Appendix A	Appendix for chap 2	76

check the notations!