

## TABLE OF CONTENT

COVER .....	i
ENDORSEMENT .....	ii
DECLARATION .....	iii
DEDICATION .....	iv
PREFACE .....	v
TABLE OF CONTENT .....	vi
LIST OF TABLES .....	ix
LIST OF FIGURES .....	xi
ABSTRACT .....	xiii
CHAPTER 1 INTRODUCTION .....	1
1.1 Background .....	1
1.2 Problem Analysis .....	3
1.3 The Objective of Research .....	3
1.4 The Benefit of Research .....	4
1.5 Research Scope .....	4
1.6 Originality of The Research .....	4
CHAPTER 2 LITERATURES REVIEW .....	5
CHAPTER 3 THEORETICAL BASIS .....	7
3.1 Breakwaters .....	7
3.1.1 Function of Breakwaters .....	8
3.1.2 Types of Breakwater .....	9
3.1.3 Curtain Wall Breakwater .....	10
3.2 Wave .....	14
3.2.1 Statistical Description of Wave Records .....	17
3.2.2 Wave Growth .....	19
3.2.3 Fetch .....	21
3.2.4 Wave Transformation .....	22
3.3 Tide .....	25
3.3.1 Astronomical Tides .....	25
3.3.2 Type of Tides .....	26

3.4	Berthing requirements .....	27
3.5	Wave Prediction .....	33
3.5.1	Wave Prediction by Using Graphic.....	33
3.5.2	Sverdup-Munk-Bretschneider (SMB) Method .....	33
3.6	Frequency Analysis .....	35
3.6.1	Probability distribution .....	36
3.6.2	Goodness of Fit Test .....	38
3.7	Smoothed Particle Hydrodynamics (SPH) .....	39
3.7.1	The History of the SPH Method.....	40
3.7.2	Advantages and Disadvantages of SPH .....	40
3.8	SPHysics and DualSPHysics.....	41
3.8.1	DualSPHysics Methodology .....	42
CHAPTER 4 RESEARCH METHODOLOGY .....		44
4.1	Research Procedure .....	44
4.2	Research Location .....	44
4.3	Flowchat .....	45
4.4	Data Collection.....	46
4.4.1	Bathymetry.....	46
4.4.2	Oceanographic Data .....	47
4.4.3	Wind Velocity Data.....	49
4.4.4	Fetch.....	51
4.5	Data analysis.....	52
4.5.1	Sverdup-Munk-Bretschneider (SMB) Method Analysis .....	54
4.5.2	Design Wave .....	55
4.6	DualSPHysics Processing.....	56
4.6.1	Prototype Modelling .....	56
4.6.2	Data Input and Processing for DualSPHysics.....	56
CHAPTER 5 RESULTS AND DISCUSSION .....		58
5.1	DualSPHysics Simulation Result .....	58
5.2	Validation .....	61
5.2.1	Comparison Transmission Coefficient with Analytical Equation ..	61
5.2.2	Transmission Coefficient for Different Relative Blockage .....	63

5.2.3	Comparison of Pressure with Analytical Equation .....	67
5.2.4	Pressure Comparison with Analytical Equation in Different Depth	73
5.2.5	Testing with Smaller Period.....	77
5.3	Port of Kuala Tanjung Berthing Requirements .....	79
CHAPTER 6 CONCLUSIONS AND RECOMMENDATIONS.....		81
6.1	Conclusions .....	81
6.2	Recommendations .....	82
BIBLIOGRAPHY .....		83