



**THREE DIMENSIONAL ANALYSIS OF SINGLE
LATERALLY LOADED HELICAL PILES IN
COHESIONLESS SOIL**

By

Omar Mohamed Elhamy Anwar Taha

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
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In
Civil Engineering-Public Works

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Key Words: Helical piles, Numerical modeling, Soil structure interaction, Strain Wedge

Summary:

Helical piles represent an efficient deep foundation system that has been widely used to support variety types of onshore and offshore structures. Predrilling process prior installation alleviates the need for large torque to install high capacity helical piles. This research used three dimensional Finite Element program (Plaxis 3D) to evaluate the performance of vertical single helical pile subjected to lateral loading. A comparison between the numerically predicted response and four lateral load tests were conducted using full-scale helical piles is presented to assess the adequacy of the adopted numerical model. This study presents a simulation for predrilling process of helical piles using two different approaches. The parametric study involved helical piles installed in dry sand. The study aims to highlight the effect of different parameters on lateral capacity of helical piles. Furthermore, the strain wedge zone pattern mobilized around long and short helical piles were also investigated in addition comparisons were performed between the results of p-y curves method and results of the three dimensional finite element analysis for short helical piles.

Dedication

To my loving and caring parents,

Mohamed Elhamy Anwar and Magda Aly

To my beloved sister,

Yara M.Elhamy

Thanks for all your love and support.

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Table of Contents

ACKNOWLEDGMENTS	II
TABLE OF CONTENTS.....	III
LIST OF TABLES	VI
LIST OF FIGURES	VII
LIST OF SYMBOLS AND ABBREVIATIONS	XIII
ABSTRACT	XV
CHAPTER 1 : INTRODUCTION	1
1.1 GENERAL OVERVIEW	1
1.2 RESEARCH OBJECTIVES	2
1.3 THESIS STRUCTURE.....	2
CHAPTER 2 : LITERATURE REVIEW	4
2.1 INTRODUCTION	4
2.2 LIMIT EQUILIBRIUM METHODS	5
2.2.2 Blum Method.....	5
2.2.3 Brinch Hansen	6
2.2.4 Broms Method	8
2.2.3.1 Piles in cohesive soils:	9
2.2.3.2 Piles in cohesionless soils:	11
2.3 ELASTICITY METHODS	15
2.3.1 Beam on an Elastic foundation (Winkler method)	15
2.3.2 The p-y Curves Method.....	20
2.3.2.1 Introduction	20
2.3.2.2 Soft Clay Criteria	21
2.3.2.3 AWT Stiff Clay Criteria.....	24
2.3.2.4 BWT Stiff Clay Criteria	25
2.3.2.5 Unified Clay Criteria.....	27
2.3.2.6 Integrated Clay Criteria.....	29
2.3.2.7 Sand Reese.et al. Criteria	30
2.3.2.8 Bilinear Criteria.....	30

2.3.2.9	Hyperbolic Criteria	32
2.3.2.10	Extended Hyperbolic Criteria	32
2.3.2.11	Pressuremeter Methods	34
2.3.3	Analysis with Non-dimensional charts Method	35
2.3.4	The characteristic load method.....	37
2.4	ANALYTICAL METHODS.....	42
2.4.1	Elastic Continuum	42
2.4.1.1	Poulos's Elastic Continuum	42
2.4.1.2	Randolph's Elastic continuum (1981).....	43
2.4.2	Finite Element	45
2.5	HELICAL PILES.....	50
2.5.1	Introduction	50
2.5.2	Installation Method.....	52
2.5.3	Laterally loaded helical piles.....	53
CHAPTER 3 : NUMERICAL MODELING METHODS		64
3.1	DESCRIPTION OF PLAXIS	64
3.1.1	Geometry	64
3.1.2	Types of Elements	65
3.1.3	Boundary Conditions:.....	67
3.1.4	Finite Element Mesh.....	67
3.1.5	Constitutive Modeling of Materials Using PLAXIS	67
3.2	L-PILE	71
3.3	NUMERICAL MODELING OF SINGLE HELICAL PILES.....	74
3.3.1	Case Study (1).	75
3.3.2	Case Study (2).	80
3.3.3	Case Study (3).	83
3.4	SUMMARY	84
CHAPTER 4 : SIMULATION OF PREDRILLING PROCESS		86
4.1	INTRODUCTION	86
4.2	CASE HISTORY	87
4.3	COMPARISON WITH F.E.M AND L-PILE	87
4.4	MODELLING OF SOIL DISTURBANCE IN L-PILE BY P-Y MULTIPLIERS	88

4.5	MODELLING OF SOIL DISTURBANCE IN PLAXIS 3D.	90
4.5.1	First Approach (Reduction zone)	90
4.5.2	Second Approach (Interface element)	92
4.6	SUMMARY	94
CHAPTER 5 : NUMERICAL ANALYSIS ON PERFORMANCE OF HELICAL PILES UNDER LATERAL LOADS		96
5.1	INTRODUCTION	96
5.2	FACTORS CONSIDERED IN THE PARAMETRIC STUDY.....	96
5.2.1	Pile configuration for parametric study	96
5.2.2	Sand soil densities	97
5.2.3	Loading type	98
5.3	BEHAVIOR OF SINGLE Laterally Loaded Piles in Cohesionless Soil	98
5.3.1	Effect of number of helical plates on lateral pile head deflection	98
5.3.2	Effect of slenderness ratio	108
5.3.3	Effect of Soil Density	110
5.3.4	Effect of pile rigidity	112
5.4	LATERAL DEFLECTION PROFILE OF Laterally Loaded Helical Piles....	115
5.5	FAILURE MECHANISM	119
5.5.1	Long Flexible helical Piles	119
5.5.2	Short rigid helical piles.....	123
5.6	COMPARISON OF PLAXIS 3D AND L-PILE.....	130
5.7	SUMMARY	130
CHAPTER 6 : SUMMARY, CONCLUSION AND FUTURE RECOMMENDATIONS		134
6.1	SUMMARY	134
6.2	CONCLUSIONS.....	134
6.3	RECOMMENDATIONS FOR FUTURE RESEARCH:	136
REFERENCES		137
APPENDIX A		A-1
APPENDIX B		B-1
APPENDIX C		C-1

List of Tables

Table 2.1: The proposed values of n for cohesive soils.....	17
Table 2.2: The proposed values of n for sands (after Terzaghi, 1955).....	17
Table 2.3: Minimum values for L/D for characteristic load method in clay soil	41
Table 2.4: Minimum values for L/D for characteristic load method in sand soil.....	41
Table 2.5: Input Soil parameter (Puri et al., 1984)	55
Table 2.6: Helix Piers dimensions (Puri et al., 1984).....	56
Table 3.1: Summary of soil parameters used for calibration.....	77
Table 3.2: Summary of soil parameters used for calibration.....	78
Table 3.3: Summary of soil parameters used for calibration.....	82
Table 3.4: Summary of soil parameters used for calibration.....	84
Table 4.1: Summary of soil properties	87
Table 4.2: Summary of Reduction zone	90
Table 5.1: Pile Geometry for parametric study purpose.....	97
Table 5.2: Cohesionless soil parameters.....	98

List of Figures

Figure 2.1: (a) The soil wedge which causes the passive resistance; (b) The pile graphical with the actual pile and the pile in the ideal loading situation (Blum, 1932)	5
Figure 2.2: Ultimate lateral resistance of short pile: (a) Soil reactions (b) Shearing force diagram (c) Bending moment diagram	7
Figure 2.3: coefficients of Earth pressure K_q and K_c	7
Figure 2.4: Failure modes of free and fixed head piles under lateral loading (Broms, 1964)	8
Figure 2.5: Lateral earth pressure distribution in clay (Broms, 1964a).....	9
Figure 2.6: Ultimate lateral resistance for short piles in clay (Broms, 1964a).....	10
Figure 2.7 : Ultimate Lateral resistance for Long piles in clay (Broms, 1964a).	10
Figure 2.8: Lateral deflections at ground surface in clay (Broms, 1964a)	11
Figure 2.9: Ultimate lateral resistance for short piles in sand (Broms, 1964b).....	12
Figure 2.10: Ultimate lateral resistance for long piles in sand (Broms, 1964b).....	13
Figure 2.11: Lateral deflections at ground surface in sand (Broms, 1964b)	14
Figure 2.12: Beam on an Elastic foundation	15
Figure 2.13: Spring constant, k_o , in Winkler Model.....	16
Figure 2.14: Lateral deflection and rotation at pile head in overconsolidated clays	18
Figure 2.15: Lateral deflection and rotation at pile head in normally consolidated clays and sands	19
Figure 2.16: Methodology in developing p-y curves (Reese and Van Impe, 2001).....	21
Figure 2.17: Soft clay criteria for static loading (Matlock, 1970).....	23
Figure 2.18: Soft clay criteria for cyclic loading (Matlock, 1970).....	23
Figure 2.19: Stiff clay criteria above water table: (a) static loading and (b) cyclic loading (Welch and Reese, 1975)	24
Figure 2.20: Empirical factors for calculating ultimate resistance in Stiff clay below water table (Reese et al., 1975).....	25
Figure 2.21: Stiff clay criteria below water table: (a) static loading and (b) cyclic loading (Reese et al., 1975).....	26
Figure 2.22: Unified clay criteria: (a) static loading and (b) cyclic loading (Sullivan et al., 1980)	28
Figure 2.23: Integrated clay criteria: (a) static loading and (b) cyclic loading	29

Figure 2.24: Characteristic shape of p-y curves for static loading in sand (Reese et al., 1974)	30
Figure 2.25: Bilinear criteria (Scott, 1980).....	31
Figure 2.26: Empirical Factors for calculating ultimate soil resistance (O'Neill and Murchison, 1983)	33
Figure 2.27: Empirical Factors for calculating initial stiffness (O'Neill and Murchison, 1983)	33
Figure 2.28: Comparison between computed results from nondimensional method and p-y method for deflection and maximum bending moment (Reese, Isenhower, & Wang, 2006).....	36
Figure 2.29: Load deflection curves (a) Clay soil and (b) Sand soil (Duncan et al., 1994)	37
Figure 2.30 : Moment deflection curves (a) Clay soil and (b) Sand soil (Duncan et al., 1994)	38
Figure 2.31 Load Moment curves (a) Clay soil and (b) Sand soil (Duncan et al., 1994)	38
Figure 2.32 Comparison between Characteristic load method and p-y analyses (Duncan et al., 1994).....	40
Figure 2.33: Comparison of Measured and Calculated Deflections and Moments for Pipe Pile in Stiff Clay [Measured Values from Reese et al., (1975)]: (a) Deflection; (b) Moment (Duncan et al., 1994).....	40
Figure 2.34: Comparison between measured and calculated results for pipe pile in sand (a) deflection; (b) Moment (Duncan et al., 1994).	41
Figure 2.35: Stresses acting on: (a) pile; (b) soil adjacent to pile (Poulos, 1971a)	43
Figure 2.36: Definition of p, and G, (Fleming, et al. 1992)	44
Figure 2.37: Mesh illustration for 3D single laterally loaded pile Model (Yang and Jeremic 2005).....	46
Figure 2.38: Geometric Model for load transfer factor (Liang and Yamin 2009).....	48
Figure 2.39 : (a) Slope stability provided by piles for the Model; (b) 3D geometric figure of the simplified decoupled model (Kourkoulis et al. 2012)	49
Figure 2.40: Basic Helical pile	50
Figure 2.41: (a) Mitchell screw pile; (b) Maplin Sands lighthouse.....	51
Figure 2.42: Helical pile installation method	53
Figure 2.43: Typical Section of helical piles (Puri et al., 1984).....	55

Figure 2.44 : Lateral Load Resistance of 3" O.D., 0.25" Wall 1-ISST Helix Piers in Clays (Puri et al., 1984).....	56
Figure 2.45 : Lateral Load Resistance of 3" O.D., 0.25" Wall-ISST Helix Piers in sands (Puri et al., 1984).....	57
Figure 2.46: Pile head Deflection in Lateral Load field test (Sakr, 2009)	57
Figure 2.47: Increase in lateral capacity with the addition of helical plates, n; after (Mittal, Ganjoo, & Shekhar, 2010)	58
Figure 2.48: Effect of the number of helices and the embedment ratio on the lateral capacity of helical piles; after (Mittal, Ganjoo, & Shekhar, 2010).....	58
Figure 2.49 : Effect of the number of helices and the embedment ratio on the lateral capacity of helical piles; after (Mittal, Ganjoo, & Shekhar, 2010).....	59
Figure 2.50: Forces acting on short helical pile in sand subject to lateral load P (Mittal, Ganjoo, & Shekhar, 2010)	60
Figure 2.51 Different configurations of model piles tested in clay; after (Prasad & Narasimha Rao, 1996).....	61
Figure 2.52: Load-deflection curves for P0, P2, and P4 (Prasad & Narasimha Rao, 1996)	62
Figure 2.53: Analytical model for short helical pile in clay (Prasad &Narasimha Rao, 1996)	63
Figure 3.1: Ten (10) node soil element adopted by PLAXIS 3D.	65
Figure 3.2: Six (6) node plate element adopted by PLAXIS 3D.	66
Figure 3.3: Twelve (12) node interface element adopted by PLAXIS 3D.	66
Figure 3.4: The Mohr-Coulomb yield surface in principal stress space ($C = 0$)	68
Figure 3.5: Definition of E0 and E50 for standard drained triaxial test results (Brinkgreve and Vermeer, 1998).....	69
Figure 3.6: Stress circles at yield; one touches Coulomb's envelope (Brinkgreve and Vermeer, 1998).	70
Figure 3.7: Subdivided pile model as used in LPILE for the finite difference solution (Ensoft Inc. 2005).	72
Figure 3.8: Mesh distribution of soil and pile.	75
Figure 3.9 Typical Lateral test load setup (Sakr, 2010)	76
Figure 3.10: A schematic diagram showing the helical pile and soil conditions in Field Test 1 (after Sakr, 2010).	77

Figure 3.11: Comparison between field and computed values from FEM of pile-head deflection.....	78
Figure 3.12: A schematic diagram showing the helical pile and soil conditions in Field Test 2 (after Sakr, 2010).	79
Figure 3.13: Comparison of field and computed values from FEM of pile-head deflection.....	79
Figure 3.14: (a) Schematic view (b) oblique view for test setup (Sakr, 2008).....	81
Figure 3.15: A schematic diagram showing the helical pile and soil conditions in Field Test (after Sakr, 2008).	82
Figure 3.16: Comparison of field and computed values from FEM of pile-head deflection.	83
Figure 3.17: A schematic diagram showing the helical pile and soil conditions in Field Test.....	85
Figure 3.18: Comparison of field and computed values from FEM of pile-head deflection.	85
Figure 4.1: Comparison of measured and computed values from L-pile and F.E.M	88
Figure 4.2: p-multiplier design curves (after Mokwa and Duncan, 2001).	89
Figure 4.3: Comparison between L-pile plus 5.0 predictions and measure behavior in pile lateral load field tests (after Sakr, 2010).	89
Figure 4.4: (a) Reduction zone around pile	91
Figure 4.5: Comparison of measured and computed values from F.E.M.....	91
Figure 4.6: The effect of the Rinter on the soil-structure interaction	93
Figure 4.7: The effect of the Rinter on Lateral deflection profile	95
Figure 4.8: Effect of Rinter on lateral pile head deflection	95
Figure 5.1: Configuration of Helices attached to pile shaft.....	97
Figure 5.2: Pile Head Deflection in Loose Sand for $L/D_{shaft}=10$	99
Figure 5.3: Pile Head Deflection in Medium Dense Sand for $L/D_{shaft}=10$	100
Figure 5.4: Pile Head Deflection in Dense Sand for $L/D_{shaft}=10$	100
Figure 5.5: Horizontal Soil elements displacement vectors for $L/D_{shaft}=10$	101
Figure 5.6 : Pile Head Deflection in Loose Sand for $L/D_{shaft}=15$	102
Figure 5.7: Pile Head Deflection in Medium Dense Sand for $L/D_{shaft}=15$	103
Figure 5.8: Pile Head Deflection in Dense Sand for $L/D_{shaft}=15$	103
Figure 5.9: Horizontal Soil elements displacement vectors for $L/D_{shaft}=15$	104
Figure 5.10: Pile Head Deflection in Loose Sand for $L/D_{shaft} = 20$	105

Figure 5.11: Pile Head Deflection in Medium Dense Sand for $L/D_{\text{shaft}}=20$	105
Figure 5.12: Pile Head Deflection Dense Sand for $L/D_{\text{shaft}}=20$	106
Figure 5.13: Horizontal Soil elements displacement vectors for $L/D_{\text{shaft}}=20$	107
Figure 5.14: Lateral Capacity of different L/D_{shaft} ratios for single straight shaft pile	108
Figure 5.15: Lateral Capacity of different L/D_{shaft} ratios for helical pile with one helix	109
Figure 5.16: Lateral Capacity of different L/D_{shaft} ratios for helical pile with two helices	109
Figure 5.17: Lateral Load capacity versus number of helices for $L/D_{\text{shaft}}=10$	110
Figure 5.18: Lateral Load capacity versus number of helices for $L/D_{\text{shaft}}=15$	111
Figure 5.19: Lateral Load capacity versus number of helices for $L/D_{\text{shaft}}=20$	111
Figure 5.20: Configuration of Helices along pile shafts.....	112
Figure 5.21: Pile Head Deflection of different number of helical plates in loose sand	113
Figure 5.22 : Pile Head Deflection of different number of helical plates in medium dense sand	113
Figure 5.23 : Pile Head Deflection of different number of helical plates in dense sand	114
Figure 5.24: Ultimate lateral load versus soil density.	114
Figure 5.25: Lateral deflection along pile length for $(L/D)_{\text{shaft}}=20$ in loose sand for different number of helical plates at $L.L=240$ kN	115
Figure 5.26: Lateral deflection along pile length for $(L/D)_{\text{shaft}}=20$ in medium dense sand for different number of helical plates at $L.L=240$ kN	116
Figure 5.27: Lateral deflection along pile length for $(L/D)_{\text{shaft}}=20$ in dense sand for different number of helical plates at $L.L=240$ kN	116
Figure 5.28: Lateral deflection along pile length for $(L/D)_{\text{shaft}}=10$ in loose sand for different number of helical plates at $L.L=160$ kN	117
Figure 5.29: Lateral deflection along pile length for $(L/D)_{\text{shaft}}=10$ in medium dense sand for different number of helical plates at $L.L=240$ kN	118
Figure 5.30: Lateral deflection along pile length for $(L/D)_{\text{shaft}}=10$ in dense sand for different number of helical plates at $L.L=240$ kN	118
Figure 5.31: Strain wedge shape for a) 3D Long pile model b) around Long pile.....	120
Figure 5.32: Strain wedge shape for helical pile with 4 helices: (a) 3D model (b) cross section	120