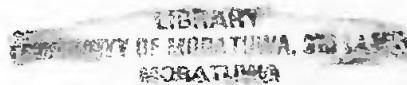


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# NUMERICAL IMPLEMENTATION OF A CONSTITUTIVE MODEL FOR SOIL CREEP

*This thesis was submitted to the Department of Civil Engineering of the University of  
Moratuwa in partial fulfillment of the requirements for the Degree of  
Master of Science*



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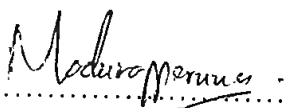
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## DECLARATION

The work included in this thesis in part or whole has not been submitted for any other academic qualification at any institute.

  
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## ABSTRACT

Multi-dimensional (2-D and 3-D) soil creep models are generalized from Bjerrum's 1-D creep model (Bjerrum, 1967), which is based on field test data. This model is based on an expression for creep strain rate, and was later modified for transient loading conditions. This differential form of 1-D creep model is extended to multi-dimensional (2-D and 3-D) state of stress and strain by incorporating concepts of visco-plasticity. The devised 2-D and 3-D creep models take into account both volumetric creep strain and deviatoric creep strain, and creep deformation of the soil is defined by several material parameters. A non-linear, time incrementing finite element program, along with iterative corrections within each time step, had been already developed for research purposes by Dr. U. G. A. Puswewala (Puswewala and Rajapakse, 1992). Certain modifications were done in the latter main program to incorporate the present model as an element subroutine for plane strain condition. The numerical model will enable to check the sensitivity of model parameters on predicted results as well as the time-dependent solution of complicated foundation-soil interaction problems involving creep of soil. Numerical analyses are conducted on three different soil-structure interaction configurations using published experimental data and parametric studies are conducted to evaluate the sensitivity of different input parameters of the model. The verified program will be an important resource tool for estimating settlements in structures founded on soils exhibiting creep.

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# CONTENTS

	PAGE
<b>ABSTRACT</b>	i
<b>ACKNOWLEDGEMENT</b>	ii
<b>CONTENTS</b>	iii-iv
List of Figures	v-vii
List of Tables	viii
List of Appendices	ix
<b>1.0 INTRODUCTION</b>	
1.1 Deformation of Soils	1-4
1.2 Numerical Implementation of Soil Deformation Models	4-7
1.3 Objective and Scope of the Research	7-8
1.4 Arrangement of the Thesis	8
<b>2.0 SOIL DEFORMATION MODELS</b>	
2.1 General	9-11
2.2 The Bjerrum Model	12-15
2.3 Critical State Models	15-17
2.4 Development of 1-D Model by Bjerrum and Vermeer	17-23
<b>3.0 THREE DIMENSIONAL MODEL</b>	
3.1 Generalization of 1-D Model into 3-D	24-29
3.2 Review of Model Parameters	29-33
<b>4.0 FINITE ELEMENT ALGORITHM FOR 3-D CREEP MODEL</b>	
4.1 Numerical Algorithm for Finite Element Analysis	34-38
4.2 General Method of Iteration and Solution	38-42
4.3 2-D Creep Analysis with Plane Strain Condition	42-45
4.4 On the Development of Finite Element Code	45-48

## **5.0 NUMERICAL ANALYSIS AND DISCUSSION**

5.1 Soil-Structure Interaction Problem Configuration-1	49-52
5.2 Soil-Structure Interaction Problem Configuration-2	52-57
5.3 Soil-Structure Interaction Problem Configuration-3	57-67
5.4 Discussion	67-69
5.5 Comparison with Observed Behavior	69-71

## **6.0 SUMMARY AND CONCLUSIONS**

6.1 Summary	72
6.2 Conclusions	72

<b>REFERENCES</b>	73-76
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<b>APPENDICES</b>	77-103
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## LIST OF FIGURES

		PAGE
Figure 1.1	Three components of settlements	1
Figure 1.2	Effect of load increment ratio on $e$ vs. $\log \sigma'$	4
Figure 2.1	Definition of 'instant' and 'delayed' compression compared with 'primary' and 'secondary' compression (after Bjerrum (1967))	13
Figure 2.2	Compressibility and shear strength of a clay exhibiting delayed consolidation (after Bjerrum (1967))	14
Figure 2.3	Principle of settlement computation (after Bjerrum (1967))	18
Figure 2.4	Consolidation and creep behaviour in standard oedometer test (after Janbu (1969))	20
Figure 2.5	Idealized stress-strain curve from oedometer test. For $t' + t_c = 1$ day, one arrives precisely on the NC-line (after Neher and Vermeer (1998)).	21
Figure 3.1	Typical $e$ vs $\log p$ curve from standard oedometer tests (conducted for 1-day periods)	31
Figure 3.2	Typical time lines defined by Bjerrum (1967)	31
Figure 4.1	Schematic diagram for computer code	47
Figure 4.2	Modular diagram for computer code	48
Figure 5.1	Finite element mesh and loading arrangement for problem configuration -1	50
Figure 5.2	Total settlement behavior of the top surface with time for problem configuration -1	50
Figure 5.3	Total settlement versus time at selected points on the loaded surface $L = (\text{distance from center point})/8\text{m}$	51
Figure 5.4	Settlement behavior for $L = 0.375$ with loads	51
Figure 5.5	Settlement behavior for $L = 0.375$ with Poisson's ratio	52
Figure 5.6	Finite element mesh and loading arrangement for problem configuration -2	53
Figure 5.7	Total settlement behavior of the surface under the foundation with time	54

Figure 5.8	Total settlement versus time $L = (\text{distance from center point}) / 8\text{m}$	54
Figure 5.9	Settlement behavior of the center point with Young's Modulus $E$	55
Figure 5.10	Settlement behavior of the center point with loads	55
Figure 5.11	Settlement behavior of the center point with modified secondary compression index	56
Figure 5.12	Settlement behavior of the center point with preconsolidation pressure	56
Figure 5.13	Settlement behavior of the center point with Poisson's ratio	57
Figure 5.14	Finite element mesh and loading arrangement for problem configuration -3	58
Figure 5.15	Settlement behavior of three selected points at the foundation level with time. $L = (\text{distance from center point}) / 1.2\text{m}$	59
Figure 5.16	Settlement behavior of three selected points at the foundation level with time for the first year. $L = (\text{distance from center point}) / 1.2\text{m}$	60
Figure 5.17	Total settlement behavior at the foundation level with time	60
Figure 5.18	Total settlement behavior at 1.1m below the foundation level with time	61
Figure 5.19	Total settlement behavior at 4.5m below the foundation level with time	61
Figure 5.20	Total settlement behavior at 7.9m below the foundation level with time	62
Figure 5.21	Total settlement behavior at 9.9m below the foundation level with time	62
Figure 5.22	Average normal stress distribution at a distance of 0.1m away from the centerline (under the foundation) with time	63
Figure 5.23	Average normal stress distribution 0.5m away from the centerline (under the foundation) with time	64
Figure 5.24	Average normal stress distribution 1.1m away from the centerline (under the foundation) with time	64





Figure 5.25	Average normal stress distribution 2.1m away from the centerline (outside the foundation) with time	65
Figure 5.26	Average shear stress distribution 0.1m away from the centerline (under the foundation) with time	65
Figure 5.27	Average shear stress distribution 0.5m away from the centerline (under the foundation) with time	66
Figure 5.28	Average shear stress distribution 1.1m away from the centerline (under the foundation) with time	66
Figure 5.29	Average shear stress distribution 2.1m away from the centerline (outside the foundation) with time	67
Figure 5.30	Data published by Bjerrum (1967) for Skoger Sparebank Building, Drammen, Norway	70
Figure 5.31	Data published by Bjerrum (1967) for Konnerud Gate 16 Building, Drammen, Norway	71
Figure 5.32	Settlement predicted for the mid-point of foundation depicted in Figure 5.14 by the finite element analysis	71

## LIST OF TABLES

		PAGE
Table 2.1	Components of a settlement analysis (Lambe, 1964)	10
Table 5.1	Soil properties for problem configuration - 1	52
Table 5.2	Foundation material properties	56
Table 5.3	Soil properties for problem configuration - 2 and 3	56



## LIST OF APPENDICES

	PAGE
Appendix-A Expressions and derivatives used in development of the model	77-81
Appendix-B List of symbols	82-84
Appendix-C Sample of a data input file and a data output file of soil-structure interaction problem configuratio-2	85-103