



Optimum Designing Of Concrete Gravitational Retaining Wall by Genetic and Bees Algorithms

A. Sanaeirad^{1*} and A. nesari²

1- Assistant professor, Department of Civil Engineering, Arak University, Arak, Iran

2- M.Sc Student, Department of Civil Engineering, Arak University, Arak, Iran

(Received 10 Oct 2011; Accepted 17 Dec 2013)

ABSTRACT

In order to design retaining walls, first the initial dimensions of the wall should be estimated. In order to choose these dimensions, the designer should use reasonable proportions that were achieved by previous experiences of the designing different retaining walls. These dimensions are introduced based on a ratio of the height of walls. Current researches showed that by changing the conditions such as properties of the backfill materials of the retaining wall, the local seismic conditions, the height of the wall and limitation in choosing the arbitrarily dimensions etc, these estimated dimensions would not be appropriate for an economical design. In this paper, by means of genetic and bees algorithms, economical dimensions of the wall for static, pseudostatic and pseudodynamic loading conditions will be calculated precisely in a such way that stability of the retaining wall against sliding, overturning and bearing capacity are provided. Also from structural consideration point of view, the designed walls could resist appropriately against the applied forces.

KEYWORDS

Genetic Algorithm, Bee, Algorithm, Optimization, Concrete Gravitational Retaining Walls

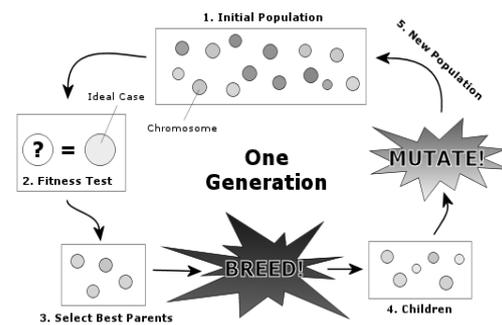
* Corresponding Author, Email: a-sanaeirad@araku.ac.ir

1- INTRODUCTION

In order to design retaining walls, first the initial dimensions of the wall should be estimated. In order to choose these dimensions, the designer should use reasonable proportions that were achieved by previous experiences of the designing different retaining walls. These dimensions are introduced based on a ratio of the height of walls. Current researches showed that by changing the conditions such as properties of the backfill materials of the retaining wall, the local seismic conditions, the height of the wall and limitation in choosing the arbitrarily dimensions etc, these estimated dimensions would not be appropriate for an economical design.

2- METHODOLOGY, DISCUSSION, RESULTS

In the present study, economical dimensions of the wall for static, pseudo static and pseudo dynamic loading conditions will be calculated precisely in a such way that stability of the retaining wall against sliding, overturning and bearing capacity are provided using genetic algorithm (Figure). In the following table (Table), the obtained results from genetic algorithm for static loading condition are compared by the results calculated manually. As the results show, the genetic algorithm estimations of dimension, are economical and the designed walls, are optimum and economical.



3- CONCLUSIONS

In this paper, by means of genetic and bees algorithms, for a few different height of gravity walls, and different loading conditions, optimum designing of these walls are studied and economical dimensions are introduced.

4- REFERENCES

- [1] M.Ghazavi and A.Heidarpour. , “Optimization of Counterfort Retaining Walls”, Fourth international Conference of earthquake engineering and seismology, 2003.
- [2] M.Ghazavi and S.Bazzazian Bonab.“Learning From Ant Society In Optimizing Concrete Retaining Walls”, Journal of technology and education Vol.5,No.3, 2011.
- [3] Pham DT, Ghanbarzadeh A, Koc E, Otri S, Rahim S and Zaidi M.;“The Bees Algorithm. Technical Note”, Manufacturing Engineering Centre, Cardiff University, UK, 2005.

	$H(m)$	$b_1(m)$	$b_2(m)$	$b_3(m)$	$b_4(m)$	$b_5(m)$	$h_1(m)$	$h_2(m)$	$b(m)$	$V(\frac{m^3}{m})$
GA results	3	0.0	0.0	0.3	0.1	0.76	0.37	2.63	1.16	1.36
	4	0.0	0.01	0.3	0.21	1.09	0.58	3.42	1.61	2.36
	5	0.0	0.01	0.3	0.4	1.31	0.79	4.21	2.02	3.74
Based on ref	3	0.0	0.0	0.3	0.45	0.75	0.375	2.625	1.5	1.94
	4	0.0	0.0	0.3	0.7	1.00	0.5	3.5	0.2	3.45
	5	0.0	0.0	0.3	0.95	1.25	0.625	4.375	2.5	4.95