

Lateralk User's Manual (Novo Tech Software Ltd.)

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1. Introduction

Software :  **LateralK**

First Release : March 2008

Licensing Model : [License File](#)

Production Team : Programming: [Alireza Afkhami](#) (M.A.Sc, M.C.P, P.Eng)

Help Translation to Spanish: [Ricardo Segovia](#) (B.Sc Civil)

Similar Programs : [Peysanj](#)

Updates : [click to open](#)

Disclaimer : [click to read](#)(See 3.)

LateralK is a computer program for calculating lateral earth pressure coefficients in static and earthquake conditions. Please keep your software up-to-date by visiting the program's [web page](#).

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4188 Hoskins Road,
North Vancouver, BC, Canada

2. References

- 1- Foundation analysis and design (5th edition)
Joseph E. Bowles
- 2- Principles of Geotechnical Engineering
Braja M. Das

3. License Agreement

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4. Contents

4.1 Input data

As it can be seen in the following picture, there are three sets of input parameters in **LateralK** program:

Soil Properties

Φ : Internal friction angle of soil in degrees (between 0 and 45)

δ : Angle of friction between soil and concrete as ratio of Φ

γ : Unit weight of backfill material

Geometry

α : Back-slope angle in degrees

β : Batter angle of rear face of the retaining wall
Total Height of wall and buried portion of the wall

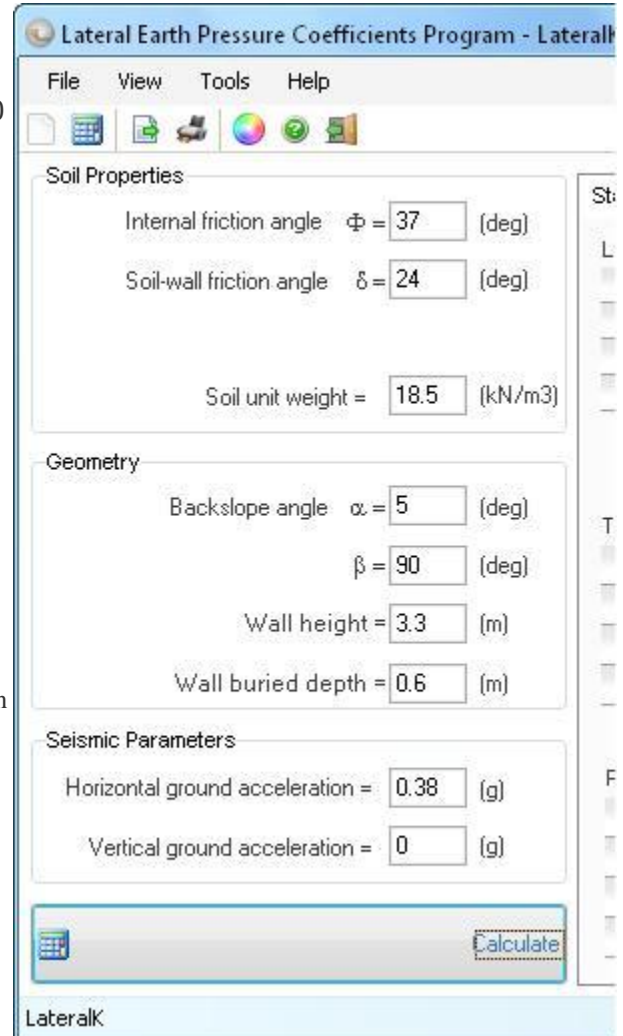
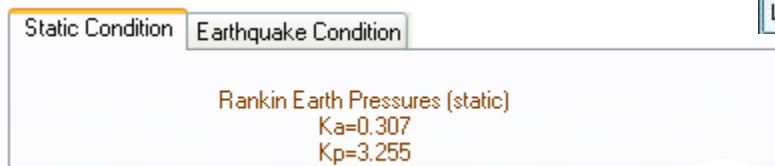
Seismic Parameters

Horizontal and vertical ground accelerations

When all parameters are entered, press **Calculate** button to view the results.

4.2 Analysis Results

When data entry in **LateralK** is done, pressing "Calculate" button calculates lateral earth pressure coefficients. Sample of static condition coefficients are show below:



For earthquake condition, K_{ae} and K_{pe} are presented for different horizontal and vertical ground accelerations (a_h, a_v) according to the following definitions:

Static Condition		Earthquake Condition									
		Active Earthquake K _{ae}					Passive Earthquake K _{pe}				
K _h (g)	K _v =0g	K_v=0.05g	K_v=0.1g	0.15g	K _v =0.2g	K _v =0.25g	K _v =0.3g	K _v =0.35g	K _v =0.4g	K _v =0.45g	K _v =0.5g
0	0.275	0.275	0.275	0.275	0.275	0.275	0.275	0.275	0.275	0.275	0.275
0.1	0.306	0.308	0.31	0.312	0.314	0.317	0.32	0.324	0.329	0.334	0.339
0.2	0.341	0.345	0.349	0.354	0.36	0.366	0.374	0.383	0.394	0.408	0.422

$$K_h = a_h/g$$

$$K_v = a_v/g$$

where g is acceleration due to gravity (9.81 m/s²). As it is shown in the picture, K_{ae} and K_{pe} are cell value in the table according to chosen values of K_h and K_v.

Note: those K_e values marked with * sign, represent a mathematical limitations in Mononobe - Okabe formula and do not have corresponding values.

4.3 Reporting

After performing the calculations if a report is needed, we recommend [Exporting](#) the results to Microsoft Excel or image files and then incorporate them into your reports (use [File](#) ► [Export](#) menu). Alternatively you can directly print the tables using the printer button on toolbar or by using File menu.

4.4 Formulas

Following is the list of all methods and formulae which are used in **LateralK** for calculating the lateral earth pressure coefficients.

Static Conditions - Active K_a

»Rankin Method

$$K_a = \tan^2 \left(45^\circ - \frac{\varphi}{2} \right)$$

»Coulomb Method

$$K_a = \frac{\cos^2(\varphi - \alpha)}{\cos^2 \alpha \cdot \cos(\alpha + \delta) \cdot \left[1 + \sqrt{\frac{\sin(\varphi + \delta) \cdot \sin(\varphi - \beta)}{\cos(\alpha + \delta) \cdot \cos(\alpha - \beta)}} \right]^2}$$

Static Conditions - Passive K_p

»Rankin Method

$$K_p = \frac{1 + \sin \varphi}{1 - \sin \varphi} = \tan^2 \left(45^\circ + \frac{\varphi}{2} \right)$$

»Coulomb Method

$$K_p = \frac{\cos^2(\varphi - \alpha)}{\cos^2 \alpha \cdot \cos(\delta - \alpha) \left[1 + \sqrt{\frac{\sin(\varphi - \delta) \cdot \sin(\varphi + \beta)}{\cos(\alpha - \delta) \cdot \cos(\alpha + \beta)}} \right]^2}$$

Static Conditions - At rest K_0

» Jaky Method

$$K_r = 1 - \sin \varphi$$

Earthquake Conditions - Active and Passive K_{ae} , K_{pe}

» Mononobe , Okabe Method

5. Online

5.1 Novo Tech Software website

<http://www.novotechsoftware.com>

5.2 Our other programs

<http://www.novotechsoftware.com/products>

5.3 Updates

<http://www.novotechsoftware.com/updates/logs/LateralK.txt>

5.4 Contact us

http://www.novolab2.com/web_forms/contact.php