Slope Stability

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Exercise 7

PSEUDOSTATIC STABILITY ASSESSMENT AND DISPLACEMENT ANALYSIS WITH NEWMARK METHOD

Part 1: Pseudostatic Analysis

Perform a pseudo static analysis of the block given in Figure 1. Geometry and geotechnical parameters are given in Table 1.

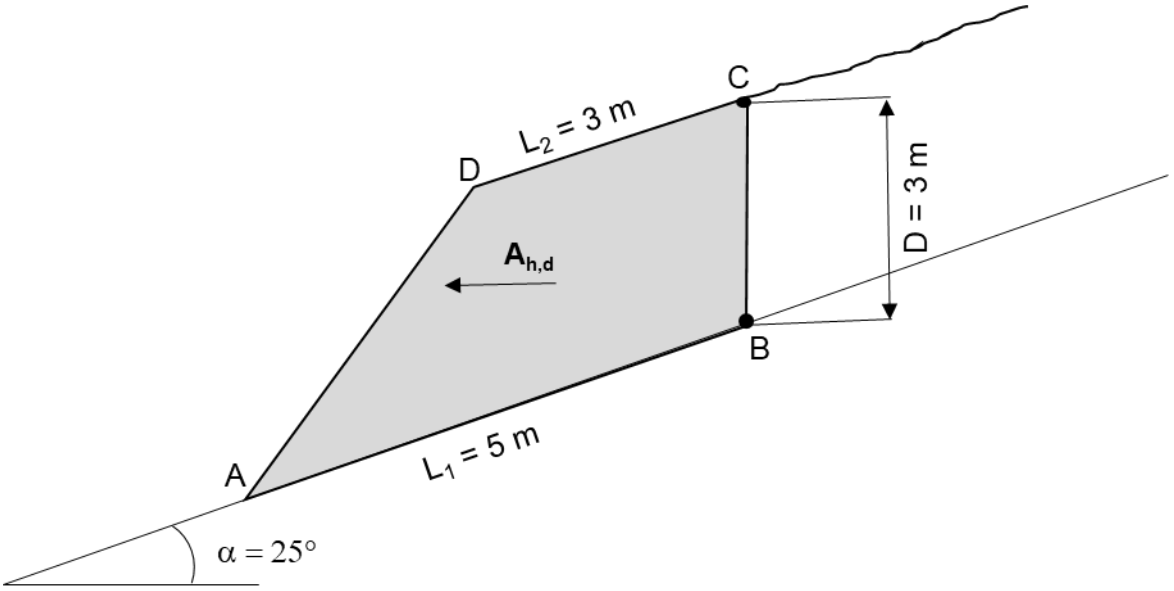

Figure 1: Block geometry.

Table 1: data for the block in Figure 1.

γ (kN/m^3)	$W=G_k$ (kN/m)	α (°)	φ' (°)	c' (kPa)
25	289.8	25.0	28.0	0

The block is subjected to a seismic action. The seismic action is considered to cause only an oscillating motion (horizontal movement) while the sussultory movements (vertical movements) are not considered here.

Adopting the pseudostatic approach for slope stability in seismic conditions, write the limit equilibrium condition for the block and evaluate the module of the horizontal force $A_{h,d}$ for ensuring a safety factor $F \geq 1$. Finally, compute the yield acceleration a_y.

Part 2: Newmark analysis

The block is subjected to the seismic input shown in Figure 2 (El Centro Earthquake, 1972).

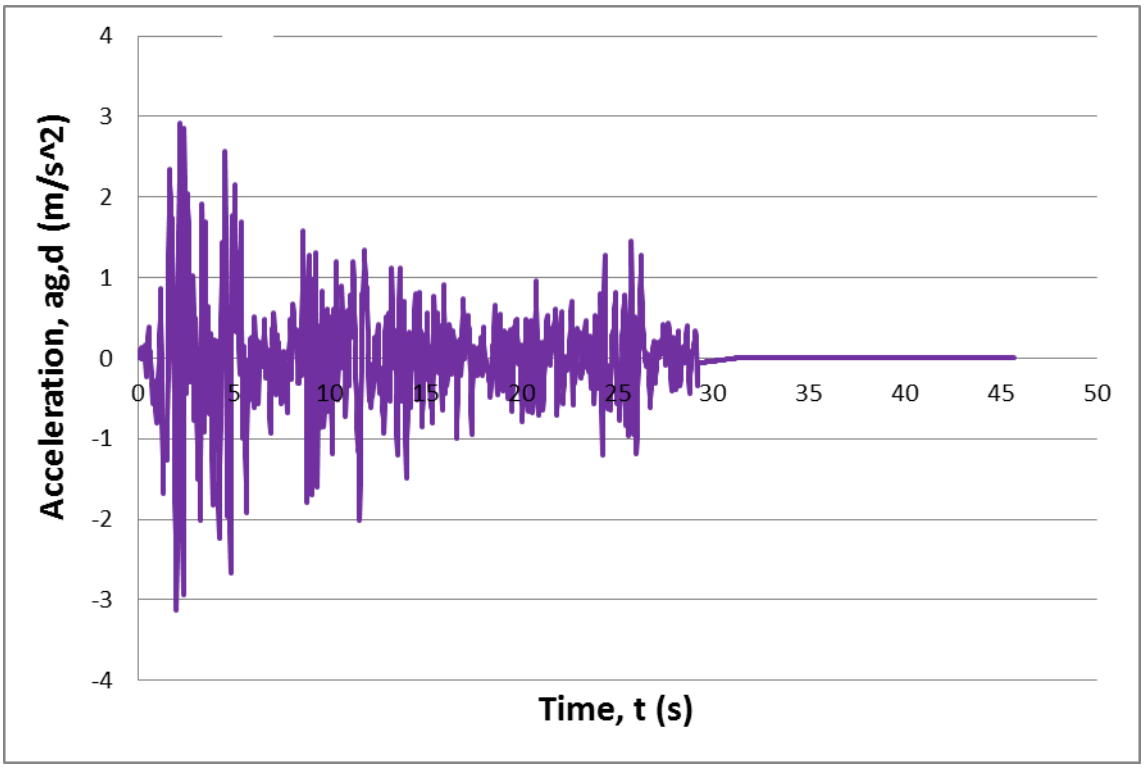

Figure 2: Seismic input.

The numerical values of the accelerogram are given in the provided excel file.

a) Find the value of the resulting force in the direction parallel to the slope, *R*, for each acceleration point given.

b) Determine the acceleration in the direction parallel to the slope as a function of time.

c) Determine the velocity correspondent to the computed acceleration (NB: consider only positive velocity values, i.e. movements of the block in the upward direction are neglected).

d) Determine the cumulative displacements of the block as a function of time.