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The influence of angle of internal friction of soil on the computation of pseudo-static seismic pressure on the retaining walls with the effect of linear surcharge

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Abstract

The existence of linear surcharges has a significant effect on the increase of seismic pressure on a wall. In this paper, a formulation has been presented to compute the seismic pressure on the wall with considering the effect of linear surcharge and the soil cohesion. The proposed formulation is applied to compute the three different types of seismic pressure coefficient (e.g., Kae, Kase, Kaqe). The proposed method has this advantage, which can investigate the impact of surcharge on an elasto-plastic environment under seismic conditions with taking into account soil parameters, such as cohesion, angle of internal friction of soil and the angle of friction between the soil and the wall. In this paper, the five dimensionless diagrams have been developed for different soil specifications and various surcharges under pseudo-static seismic state. According to these diagrams, the pseudo-static seismic active pressure on the wall can easily be obtained with respect to surcharge and cohesion of soil. The results of this study demonstrate that the increase of the angle of internal friction of soil and cohesion may decrease nonlinearly the seismic wall pressure, but the increase of linear surcharge and horizontal acceleration coefficient can increase the seismic soil pressure. Additionally, an increase in the horizontal acceleration coefficient can result in negligible changes in seismic pressure compared to surcharge. Moreover, a computer program is written in a Matlab based software environment, and the results of these codes can be applied to compute the seismic pressure on the wall with the effect of linear surcharge on cohesive-frictional soils.

Key words: Active earth pressure coefficient, Line surcharge, Pseudo-static seismic coefficient, Horizontal seismic coefficient.

1. Introduction

The computation of the active earth pressure is one of the important topics in geotechnical engineering. Despite the existence of surcharges, the exact computation of active earth