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Support capacity of wedges along tunnels of Egnatia highway

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Abstract

Four tunnels along the under construction Egnatia highway, were studied in N. Greece (Polymylos and Vassilikos areas). The concept was to investigate the changes of the safety factors and the support ability of the wedges, regarding to their dimensions, taking also into account the spacing of the discontinuities. The safety factors of the wedges, as well as their ration before and after support, were correlated significantly with the weights and the volumes of the wedges, using powered regressions. According to these results the efficiency of the support ability of the shotcrete is very high in cases where the rock mass is cracked. There is no difference in safety factor between using only shotcrete and using shotcrete and rockbolts for supporting relatively small wedges. This ability decreases dramatically for bigger wedge volumes, over $20m^3$ and of weights in cases where these are over about 40tns. In these cases, the shotcrete presents low efficiency and bolting is the main support measure performed.

Keywords: Wedges; Tunnels; Egnatia highway

1. Introduction

The tunnels under study are located in N. Greece (Polymylos area) and in W. Greece (Vasilikos area). They are parts of the, under construction, Egnatia highway that links the western coast of Greece with its eastern bounders.

Three tunnels from Polymylos area and one from Vasilikos area are studied. They were selected for studying because the excavated rock mass is gneiss and limestone, which are common formations in Greece. The tunnels consist of two parallel branches, the right and the left branch.

The concept of the present study was to investigate the changes of the safety factors and the support ability of the wedges, regarding their dimensions, taking also into account the spacing of the discontinuities.

2. Geological settings

Polymylos area is geologically located in the Pelagonian zone consisting, from the lower to the upper parts, of gneiss, amphibolites, schists, granite of Upper Carboniferous, semimetamorphic rocks of Permian–Triassic, carbonate rocks of Triassic–Jurassic, ophiolites and sediments emplaced during the Upper Cretaceous transgression. The tunnels cross the formation of micaceous and amphibole gneiss and biotitic–hornblendite granite (IGME, 1993).

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