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Evaluation of squeezing conditions to determining support & optimal support and installation distance

Soroush Ghaderi [1], Fazlollah Soltani [2]
1- M.A student in civil engineering – soil and foundation: industrial-supplementary education university, Kerman-Iran
2- Associate of industrial supplementary education university, Kerman- Iran

S.ghaderi4045@gmail.com

Abstract

Inadequate information of qualification & squeezing degree of susceptible rock, results to delay, re-construction & imposing extra expense, in the most of the tunnel project.
For prediction of squeezing in tunnel, various methods depend on rock features, tunnel geometry characteristic's & size of tunnel and shaped plastic radius around the tunnel were proposed, which of course in them, the most important factor, as distance to tunnel face and effect of un plasticized zone radius were ignored and in fact supports design was done based on the most critical condition.
In this paper, based on analytical & experimental studies, a new method was introduced, to estimate squeezing in rock masses, that, by using this method, the optimize distance of the last row of installation, work maintenance and optimal size of dig step could be determined safely, so that in addition of prevention of displacement distribution in further distances, far from the face, the support system not yield in entrant pressure.
Keywords: Squeezing, Tunnel, Plastic zone, Distance to face

1. INTRODUCTION

Squeezing phenomena, found as a one of the rock mass perilous behaviors in tunneling industry. In squeezing ground, rock mass is convergent inside the tunnel & causes some difficulties in supporting & continuance of tunneling procedure. Thus towards the tunnel excavation in such environments, first it is necessary to check squeezing intension & then considering obtained information, proceeding into excavation and utilize support system designing.

Initial scientific description for squeezing rocks is presented by Terzaghi. According to this description, squeezing, call into the rock, that moves slowly into the tunnel direction, without any sensible increase in volume. Generally squeezing can descript in terms of resulted displacement & convergence from development & mixture of infusion tension during dig. It occurs when induced shear tension in dig be more than shear resistance of under-ground rock masses. This phenomenon may impose extra expense, delay in re-construction & even destruction of surface cover while tunneling.

For evaluate squeezing potential there are two common methods: empirical & mid-empirical. Empirical methods are based on two factors, rock mass classification & tunnel depth. In mid-empirical methods squeezing potential rated with single-axial compressive strength &in-situ tension. From empirical methods may hint Goel.et.al (1995) & Singh.et.al (1992) methods & from mid-empirical methods may imply to Hoek & Marinos(2000) & Aydan.et.al (1993) & Jethwa.et.al (1984) methods.

Till now at all of the represented methods the distance from the face and plastic zone conversion along tunnel were disregarded. The importance of this issue is that these two factors have much effect on excavation step & optimal support of tunnel.

Hence, purpose of this paper is present a new method of evaluation of squeezing potential forasmuch as distance from the face and plastic zone conversion. Therefore Hoek & Marinos method which currently was considered, is used as a base action. Then by Longitudinal Deformation Profile, the connection of distance from the face and size variations of plastic zone with Hoek&Marinos method would be studied & at last