Wave Equation in Rock masses with numerical modelling

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Abstract

Numerical tests on three-dimensional rock samples containing hole were carried out with finite element software ANSYS to investigate the mechanism of zonal disintegration within surrounding rock mass around deep circular tunnel under dynamic disturbance. Numerical tests presented thedistribution of stress and deformation and visualized zonaldisintegration phenomenon of rockmass around deep semiarched tunnel under dynamic loads. The simulation results indicate that zonal disintegration phenomenon may occur, when superposition value of high ground stress and dynamic disturbance satisfies a certain condition.

Keywords :Rock mass around deep tunnel, disintegration, Numerical test, Dynamic disturbance

I. INTRODUCTION

At present, with the deep excavation of deep rock engineering responsed a series of new scientific phenomena ,such as zonal disintegration phenomena and rock burst, these new scientific phenomena compared with shallow rock

engineering has different characteristics. There into, the zonal disintegration phenomena [2] is in the excavation of deep rock roadway or cavern, in its sides and in front of work of the surrounding rock produced successive alternate ruptured zone and unruptured zone phenomenon. This phenomenon have found in many foreign deep mines[3-4]. These deep problem is no longer the linear superposition factors sciencesystem which we are familiar with the factors, but nonlinear science system, caused great concern of the international rock mechanics engineering field experts and scholars ,become the great interest in this field research hot spot in recent years.

Current research mainly focuses on deep protolith stress field, physical mechanics characteristic of buried rock of the influence of zonal disintegration mechanism, and made some important achievements[6-7]. But the present study most isgiven priority to static, dynamic loads less consider to under the influence of the deep stress rock. According to the zonaldisintegration loading model who GuJinCai etc[8], Namelyto parallel hole axis for the first principal stress and the tunnel axis loading exert dynamic disturbances. Numerical experiment and analysis werecarried out with finite element software ANSYS to the mechanism of zonal disintegration within surrounding rock mass around deep under dynamic disturbance.

II. NUMERICAL COMPUTATION MODEL