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FACULTY OF SCIENCE AND TECHNOLOGY

DEPARTMENT of

CIVIL AND ENVIRONMENTAL ENGINEERING

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" Effects of joints in rock masses under blast-induced vibrations "

by

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Abstract

Explosive controlled blasting is an effective method in underground construction for rock breakage in the utilization of urban underground space. At the same time, the blast-induced vibration is a major concern. In general, site specific empirical relationships between the maximum vibration magnitude (called peak particle velocity, PPV) and the

scaled distance (SD), which is a collective parameter taking into account the amount of explosive and spatial distance between the explosive source and the point of measurement are derived using filed records. Yet, the influence of rock joints on the wave propagation has been seldom systematically investigated.

The wave propagation through a jointed rock masses was investigated with the finite difference package FLAC2D. The joint was simulated as an interface between two elastic rock bodies. As the properties of joint have great effects on the amplitude and frequencies of transmitted wave, the relationship between joint stiffness and the amplitude of transmitted wave in form of transmitted coefficient was described. The wave propagation through multiple joints with different orientations and various spacing was studied. The influence of roughness in joint during wave transmission was examined. It was found that the properties of joints have great effects on the transmitted coefficients. The number and orientations of joints influence the amplitude of transmitted wave pronouncedly.

The numerical study on propagation of blasting wave in hypothetical rock slopes with and without joints applied was carried out. With the blasting source obtained from a versatile explicit analysis tool AUTODYN. The relationship between peak PPV and SD was studied by considering different distributions of joints and different locations of the blasting source. It was found that the joints have noticeable influence on the relationship between PPV and SD. Through all performed numerical analysis, a better understanding of the effects of joints in the propagation of vibrational waves in has been obtained which can be used as a primary reference for the more complicated situations.

Biography

After receiving her Ph.D. degree, Dr. Zhou Jianmei has been working as a Research Fellow in the University of Hong Kong in the field of geotechnical engineering. The research topic is about the joints effect in rock masses under blasting-induced vibrations.

ALL ARE WELCOME!