论文

岩体应力应变曲线转型的孔压效应与降雨滑坡的机制分析

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摘要：

从宏观与微观机制方面探讨了孔隙水压力对岩体脆－延性转变的影响。定义了一个峰后破坏割线模量 E_{post} 来表征孔隙水压力对岩体应力应变曲线转型的效应，并结合突变理论得到的斜坡失稳的刚度判据，进一步分析了孔隙水压力对应力应变曲线峰后斜率的影响，随孔隙水压力的增加，峰后曲线斜率变陡，峰后刚度增大，即材料的均匀性、脆性增大与刚度比k减小。因此在系统内部条件不变时，刚度比k=1时就存在一个临界孔隙水压力$p_{wcritical}$ ，即降雨等涨落因素引起滑面介质中的孔隙水压力大于这个临界值时斜坡就易于发生突变失稳。从而深化认识了降雨等外部涨落因素对斜坡系统失稳的重要触发作用。

关键词： 孔隙水压力▆应力应变曲线▆峰后破坏割线模量 E_{post} ▆峰后斜率▆临界孔隙水压力 $p_{wcritical}$ ▆突变失稳

EFFECTS OF PORE-WATER PRESSURE ON TRANSITION OF ROCKMASS STRESS-STRAIN CURVES AND THE MECHANISM OF RAINFALL-INDUCED LANDSLIDES

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Abstract:

The effects of pore-water pressure on the apex post characteristics of stress-strain curves for rock mass are analyzed from the macroscopic and microcosmic mechanisms. An apex post modulus E_{post} which indicates the effect of pore-water pressure on stress-strain curves transition is defined. Bycombining with the stiffness criterion of landslide, the effect of pore-water pressure on stress-strain curves apex post slope is analyzed. Along with the increase of pore-water pressure, the apex post curve slope becomes steep, and the apex post stiffness increases. The homogeneity and brittleness of slide surface medium increases and the stiffness ratio k decreases. When the system conditions don't change, corresponding with k =1, the pore-water p ressure has a critical value $p_{wcritical}$. When the pore-water pressure surpasses the value pwcritical, landslide is prone to be induced by rainfall. Consequently rainfall and other condtion changes have important effects inducing landslides.

Keywords: Pore-water pressure, Stress-strain curve, Apex post modulus E_{post} , Apex post slope, Critical pore-water pressure $p_{wcritical}$, Catastrophe instability, Landslide

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