Mechanism of Debris Flows in Mountain Streams

苟昌煥, 馬世瑋, 賴孟緯
Architecture and Urban Planning
College of Architecture and Design
chkou@chu.edu.tw

Abstract

This paper suggests the mechanism of occurrence of debris flow in mountain streams. It is found that the sliding of the undermined stream banks follows the exponential probability distribution function. This indicates that the major amount of debris is from an intensive sliding in the initial stage of flood flow development. This can be otherwise proved by the viscous flow boundary layer theory such as the shear stresses on the wall are initially very large. Through a relative dimensional analysis, a special dimensionless parameter K is grouped which has a very important effect on the occurrence of the acceleration of the heavy debris by the flow. It interprets, during the flood flow development, the amount of debris on the stream bed can only be accelerated when the kinetic energy $\rho wV2$ of the flow is greater than the apparent work ($\rho s-\rho w$)gD of the debris against the flow. Of course, as a transient behavior, once it starts, the sudden acceleration of a huge amount of debris flow bore will usually cause an unpredictable downstream disaster.

Keyword：mechanism, debris flow, stochastic approach, dimensional analysis, debris flow bore, transient behavior.