



Hydraulic characteristics of debris flows in a drainage channel with stepped dissipater

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Sichuan-Tibet railway started from Chengdu, via Pujiang, Ya'an, Kangding, Litang, Zuogong, Bomi, nyingchi, and lhasa, which covers a distance of 1,629 km. The Sichuan-Tibet railway cuts through the alpine region that has the feature of large elevation difference, active tectonics, and obvious space differentiation. Debris flows with high density, low viscosity, and high speed are one of the most common geo-hazards in these regions. A new type of drainage channel with stepped dissipater was proposed to apply to mitigate the debris flow disaster in the alpine region. The debris flow patterns, debris flow velocity, energy dissipation along the drainage channel were analyzed under different structures of the drainage channels based on the experiments. The roughness coefficient calculated by the Manning formula was also investigated along the flow depth for both rectangular channel and the channel with stepped dissipater. The results indicated that compared with the traditional rectangular drainage channel, the channel with stepped dissipater has more efficiency to decrease the flow velocity, Reduce the abrasion along drainage channel, and improve the energy dissipation rate due to the Intense collision, friction between debris flows and the solid boundary. The maximum energy dissipation rate reaches approximately 61%. Based on the theory of particle projectile, the relation between the step length and the debris flow velocity, step height was proposed..