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Investigating the impact of slope angle on the effectiveness of the slit barriers in dissipating the kinetic energy of debris flows

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Debris flows are comprised of water and loose sedimentary deposits that occur in mountainous regions as a result of intense precipitation. Due to the rapid speed and massive volume of these flows, rigid barriers are installed along the flow path to dissipate the energy of the flow and prevent damage to downstream infrastructures. Nevertheless, the efficiency of these barriers is significantly affected by the velocity of the flow. Ignoring the approach velocity may even contribute to an increase in the energy and destructive power of the flow downstream. Hence, in this study, the influence of the slope angle of the bed, which is a crucial determinant of flow velocity, on the effectiveness of the barriers is investigated. According to findings from the FLOW-3D software, the installation of a row of cubic barriers on steep slopes leads to an increase in flow kinetic energy. However, barriers have no impact on energy dissipation on moderate slopes. In contrast, the construction of cubic barriers lowers the flow kinetic energy by more than 50% on moderate slopes.

Keywords

Debris flow, Rigid barriers, Slit barriers, Energy dissipator, FLOW-3D

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