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DEM simulation for landslide process and barrier dam formation on the mountainous highway

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A barrier dam induced by landslide in Hanyuan, Sichuan, China occurred on August 6th, 2009. An approximately 9x10̂6 m̂3 sliding mass dumped rapidly into the Dadu River and buried the new highway S306. After the major landslide, the large-scale debris mass caused the secondary shallow avalanche at the opposite bank and even formed a barrier dam with a length of 100 m and a height of 40 m crossing the Dadu River. The corresponding backwater effect submerged the upstream village over 10 km. This study adopts DEM simulation to examine the dynamic landslide process and understand the triggering mechanism of barrier dam. Based on the numerical investigation, the results showed that the sliding behavior can be classified into three stages: first initial stage with high potential energy, primary sliding with fast velocity, and final stage of impacting river channel. In addition, the energy balance principle for dynamic landslide is also verified with the DEM simulation. With respect to the consideration of hazard managements, one hopes the result can assist engineers to evaluate dangerous potential region and plan protecting construction on the steep mountainous area.

Keywords:Landslide, barrier dam, DEM, dynamic process, backwater.