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Modeling the propagation and run-out from gravel-silty clay landslide to debris flow in Shaziba, southwest Hubei Province, China

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Numerical modelling is the physically-based method for in-depth analyzing the process from landslide to debris flow. Particle flow analysis method (PFC) has the advantage of dealing with such processes, like debris flow formation, propagation, and deposition. Hence, our study to analyze the dynamic characteristics of a landslide-generated debris-flow, taking the Shaziba landslide-debris-flow as example, which occurred in Enshi City on June 8, 2020, under complex landslide material composition, Combined the field survey, unmanned aerial vehicle (UAV) aerial photography, and laboratory direct shear tests, the velocity, displacement and the characteristics of the landslide-generated debris-flow were simulated. The results indicated that the initial stage of the landslide starts with an overall motion acceleration with a time around 733 s. The maximum velocity of the landslide body is 17.5 m/s, and the maximum displacement is 1500 m with a total volume of $9.31 \times 10^5 \text{ m}^3$. The simulation results are closer to the actual landslide volume ($1.0 \times 10^6 \text{ m}^3$) and the form of the dam in Qingjiang. The study reveals the mechanism of dam formation, which could be served as useful information for natural hazards management to prevent the river from being blocked by landslides or debris flows.