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Analysis of debris flow according to the location of the check dam: suggesting the optimal location by numerical simulation

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The shallow landslide-generated debris flow on hillside catchments plays a critical role in the change of landscape features caused by natural hazards. When these debris flows occur in dams or reservoirs, they reduce the efficiency of facilities, and when they occur in residential areas, they cause many casualties and property damage. To minimize such damages, some methods can be performed through 1) installation of the warning system and 2) construction of check dam. However, in the case of rainfall-induced debris flow, preparation through a warning system is challenging because debris flows very rapidly. Therefore, to reduce the damage caused by debris flow events, the check dam needs to be installed, and for an efficient installment, a study on numerical modeling needs to figure out. Therefore, in this study, the Deb2D numerical model was used to analyze the mitigation effect through the check dam. This model is a two-dimensional debris flow simulation software based on quadtree-grid. The debris flow was simulated by Voellmy rheology, and the erosion, entrainment, and deposition processes that must be considered for the analysis of debris flow were simulated through the algorithm suggested in our recent study. The Raemian apartment and Galram-ri debris flow events were analyzed which occurred at Mt. Umyeon in 2011 and Gangwon-do in the Republic of Korea. In addition, a check dam was hypothetical by changing the distance from the collapse zone. The efficient location can be suggested through the simulation results.

Keywords**:** Debris flow; Numerical model; Check dam; Mitigation effect

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