

## 3D debris flow simulations by using smoothed particle hydrodynamics (SPH) method

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Yamashiki et al. (2012) and Yamashiki et al. (2013) perform laboratory experiments that represent a debris flow. We use smoothed particle hydrodynamics (SPH), Lagrangian numerical hydrodynamics method, and reproduce the experiments by 2D simulations. We find that water does not erode rock by using same size particles between water and rock, but that water can erode rock by using smaller size water particles than rock particle. We could extend this 2D simulation to 3D one and reproduce more realistic results.

Also, debris flows include not only rock and water but also mud. We developed a 3D SPH code that includes the solid-liquid mutual interaction with fully SPH manner to deal with multiphase flow well. We compare the results of the code with the results of a land slide experiment and some simulations in Igarashi et al. (2012) and find that we can get the results similar to those of experiments. We also try to perform more realistic debris flow simulations in Hiroshima in 2014's cases.

Keywords: debris flow, smoothed particle hydrodynamics