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An experimental study on effects of grain size distribution on debris flow deposition characteristics

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Precise prediction of travel distance of debris flow is required to design countermeasure strategy against natural disaster. A lot of numerical simulation tools have been developed using a selected shear stress which has been modeled to express the characteristics of debris flow and a modeled entrainment ratio. However, the calculation results for past events often show underestimated travel distance. One of the possible causes of the fact may be that the effect of grain size distribution on the entrainment ratio. This is because most models have been modeled assuming debris flow is constituted by a single size particle. An entrainment ratio model involving the effect of particle size distribution may improve the calculation reproductivity. From an engineering point of view, it is desirable that the effect can be taken into account as simply as possible. In this study, we conducted an experiment to know the extent to which the entrainment ratio is affected by the grain size distribution. The experiments were undertaken in a rectangular flume the channel slope of which can be adjusted at two points in longitudinal direction. Two-size mixtures of spherical glass beads or gravels were set as debris flow material. For each mixture, travel distance of debris flow and fractions of each size of debris flow material deposited near the channel slope change point were measured using high-speed camera.