Experiments Dealing with the Impact Forces Caused by Debris Flows

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In Austria debris flow breakers are a usual structures within torrent control systems. Although since approx. 30 years practical experiences to this construction type were gained, more precise design principles are missing. In order to fill this gap, small scale experiments were carried out. The experimental plant consisted of an flume with a length of 4 m and a width of 0,3 m. Inside this flume models of open check dams were situated, which have been equipped with pressure gauges, while the flume itself was equipped with ultra sonic sensors. So the occurring pressure in several levels, as well as the flow depth have been measured. As experimental material a mixture of potter's clay, water and gravel has been in use. By varying the proportion of the three components several standardized mixtures have been defined for the experiments. From these model tests a dependence between the Froude number and the arising pressure peaks could be found. On the basis of this evaluation a simple empirical formula was derived for the computation of the pressure peaks maximally arising at the structure. This formula suggested here, needs only the density of the debris flow material, the flow depth and the velocity. These are values, which can easily, at least in orders of magnitude, be estimated. In comparison with usual methods to the determination the impact on structures, it shows up that the suggested formula with low Froude numbers shows good correspondence with the so far used methods, however with high Froude numbers far higher pressure values results in it.