NUMERICAL SIMULATION OF TWO-PHASE FLOW MODEL FOR DEBRIS FLOW

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Abstract. This study is based on the concept of two-phase flow model .Numerical simulation of a three dimensional conceptual two-phase flow model is considered in this study. The simulations are compared with laboratory experiments. The comparison indicates that the conceptual two-phase flow model is suitable to simulate debris flow, and it can give accurate estimations to the width ,length and height of the deposition area.

Keywords. conceptual two-phase flow model, liquid phase, solid phase, numerical simulation, deposition area.

AMS (MOS) subject classification: 76F60,76T99.

References

[1] Harald Teufelsbauer, Y.Wang, M.-C.Chiou, Flow-obstacle interaction in rapid granular avalanches:DEM simulation and comparison with experiment, *Granular Matter*, **1**, (2009) 209-220.

[2] R.Kaitna, D.Rickenmann, M.Schatzmann, Experimental study on rheologic behaviour of debris flow material, Acta Gertechnica, (2007) 71-85.

[3] S.B.savage, K.Hutter, The motion of a finite mass of granular material down a rough incline, J.Fluid Mesh, **2**, (1989) 177-215.

[4] K.Hutter, K.R.Rajagopal, On flows of granular materials, Continuum Mech, (1994) 81-139.

[5] D.Rickenmann, D.Laigle, B.W.McArdell,J.Hübl, Comparison of 2D debris-flow simulation models with field events, Computational Geosciences, **10**, (2006) 241-264.

[6] Ni Jinren, Wang Guangqian, Conceptual two-phase flow model of debris flow:I. Theory, ACCT GEOGRAPHICA SINICA, (1998) 66-76.

[7] HU Jiang, KUANG Shang-fu, XU Yong-nian, 2-D numerial simulation of viscous debis flows, Journal of Sediment of Research,**6** (2006) 60-64.

[8] Shiva P Pudasaini, Yongqi Wang, Kolumban Hutter, Rapid motions of free-surface avalanches down curved and twisted channels and their numenrical simulation, PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY, (2005) 1551-1571.

[9] SHU Anping, Wang Le, Kaiyang, FEI Junxiang,Investigation on movement characteristics for non-homogeneous and solid-liquid two-phase debris flow, SCIENCE CHINA, **31** (2010) 3006-3012.

[10] CHEN Hong-kai,TANG Hong-mei, CHEN Ye-ying,Researcher on Method to Calculate Velocities of Solid Phase and Liquid Phase in Debris Flow, Applied Mathematics and Mechanics,**31**, (2006) 357-364.

[11] NI Jin-ren, QU Yi-zhong,Modeling of vertical segregation of solid particles in sediment-laden flow, JOURNAL OF HYDRODYNAMICS, (2003) 349-354.

[12] National Reasearch Council(1991) The eruption of Nevado del Ruiz Volcano, Colombia, South Americal, November 13, 1985, The Committee on Natural Disasters.

[13] National Reasearch Council(1994) Mout Ranier: Active Cascade Volcano , The US Geodynamcs Committee.

[14] Fluent Inc.Gambit 2.2.30 Modeling Guide.Lebanon,NH:FluentInc.;2001.

[15] Fluent Inc.Fluent 6.0 user's guide.Lebanon,NH:Fluent Inc.;2001.

[16] WANG Fan, HUANG Peng, Advanced Applications and Case Analysis of Fluent, Tsinghua University Press,Beijng, 2008.