Turbulence Model Influence in the Breaking of a Dam Problem

Pablo A. Caron*, Marcela A. Cruchaga†, Axel E. Larreteguy*

* Universidad Argentina de la Empresa

Lima 717, C1073AAO, Ciudad Autónoma de Buenos Aires, Argentina

pcaron@uade.edu.ar, alarreteguy@uade.edu.ar

† Universidad de Santiago de Chile

Av. Bdo. O'Higgins 3363, Estación Central, Santiago de Chile, Chile

marcela.cruchaga@usach.cl

ABSTRACT

In the present work, two-fluid simulations and experimental [1] results are compared to assess the effect of using different turbulent models. Simulations are carried out using two turbulent models, k-epsilon and Spalart-Allmaras, and the laminar model [2,3]. The main goal is to assess the effect of turbulence models in the prediction of the interface position. Additionally, surface tension and dimensional effects are analysed by carrying out both 2D and 3D simulations.

Good agreement between numerical and experimental results is found when k-epsilon model is used. On the other hand, numerical results when using laminar and Spalart-Allmaras models has showed non-physical droplets formation. Also, laminar results present a strong mesh size dependency. Additionally, surface tension modeling does not seem to play a relevant role in the interface evolution.

REFERENCES

[1] M. A. Cruchaga, D. J. Celentano and T. E. Tezduyar, "Collapse of a liquid column: Numerical simulation and experimental validation", *Computational Mechanics*, 39 (4): 453–476 (2007).

[2] E. Berberović, N. P. van Hinsberg, S. Jakirlić, I. V. Roisman and C. Tropea, "Drop impact onto a liquid layer of finite thickness: Dynamics of the cavity evolution", *Phys. Rev. E*, 79: 036306 (2009).

[3] S. S. Deshpande, L. Anumolu and M. F. Trujillo , "Evaluating the performance of the two-phase flow solver interFoam", *Computational Science and Discovery*, 5 (1): 014016 (2012).