

## **Modelling of a tailings flow case history using MPM**

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### **ABSTRACT**

The Castaño Viejo mine, located in the Andes Mountains of San Juan Province, Argentina, was in operation between 1956 and 1964. The principal extraction of the mine was lead, zinc and gold. A series of tailings dams were built during operation. One of these dams collapsed and the reason of the failure are unknown. The tailings flowed downstream for 3 km causing 3 casualties without reaching the Castaño River. This paper describes the Material Point Method modelling of this case history. MPM [1] is a lagrangian “particle-mesh” numerical method previously used in modelling dynamic problems with large displacements. With MPM, a body is discretized into a collection of lagrangian particles, which carry all the data needed to define the body’s state. Interaction between particles takes place in a background fixed mesh, similar to those used in the finite element method. An ASTER GDEM digital elevation terrain model and in-situ GPS measurements were used to generate the boundary condition for the MPM three-dimensional model. A region of 268 hectares with very high average slopes was modelled with an interpolating grid of 5m per 5m. The tailing material was modelled using Bingham constitutive equation. Results of the model runout are compared with GPS measurements of flow relicts and estimation of tailings deposits depth.

### **REFERENCES**

- [1] Sulsky D, Schreyer HL, Zhou S-J, Application of a particle-in-cell method to solid mechanics, Computer Physics Communications 1995; 87: 236-252.