

# Mathematical model simulating the Slurry Pipeline in pressurized conduits

Tarik Chakkour<sup>a,\*</sup>

<sup>a</sup>INRA. 5 chemin de Beaulieu, 63000 Clermont-Ferrand, France.

## Abstract

Numerous slurry transportation pipeline systems have been built in the past 10 years. At the same time, T. Chakkour & F. Benkhaldoun study in [1] the hydraulic transport of particles in tubes. We investigated in [2] the hydraulic transport of slurry system in horizontal tubes (The Houribga mines). This mineral pipeline has often been referred to as one of the most challenging projects in terms of operating complexity and system configuration in Morocco. This physical model features a mass and momentum balance for three-fluid model in 1D. It allows to predict the pressure drop and flow patterns. The originality of this work is to present in simplified form a homogeneous single-phase model. The most important advantage of this model is the considerably smaller number of variables to be solved compared to the multiphase model. In this presentation, we give the asymptotic behavior of friction-disharge term  $fQ^2$  that is involved in the last term of motions equation, taking into account the Reynolds number. This allows to understand how the elevation varies, when the flow is very laminar.

**Keywords:** Slurry shield; Pipeline transport; homogeneous single-phase; method of characteristics.

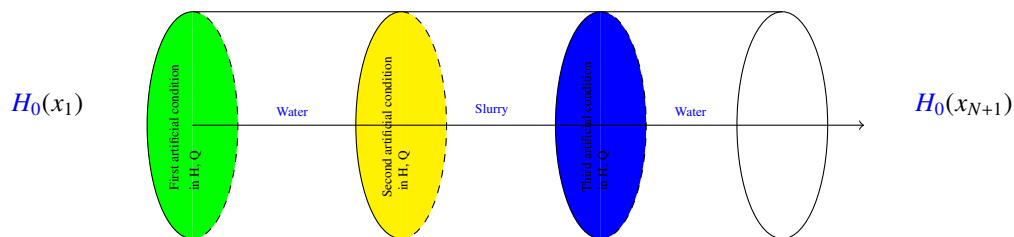


Figure 1: Schematics of water-slurry-water flow in a circular pipe with artificial conditions.

## References

- [1] Tarik Chakkour. Simulations numériques des tubes avec contraction brusque sur openfoam. *Thermodynamique des interfaces et mécanique des fluides*, 17, 2016.
- [2] Tarik Chakkour. Slurry pipeline for fluid transients in pressurized conduits. 19, 2018.

\*Corresponding author  
Email address: [Tarik.Chakkour@inra.fr](mailto:Tarik.Chakkour@inra.fr) (Tarik Chakkour)