

## Accepted Manuscript

Unresolved CFD-DEM modeling of multiphase flow in densely packed particle beds

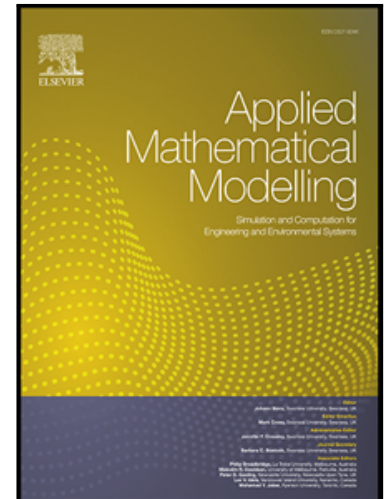
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**Highlights**

- A VOF-DEM model was implemented in open-source softwares and used to study drainage in densely packed particle beds.
- Instability issues inherent to the model were found for particle beds with particle densities lower than the fluid's.
- A smoothing approach was proposed to deal with these instabilities by filtering high frequency pressure fluctuations.
- Experiments were conducted and the model successfully reproduced the measurements and observations.
- Different drainage was observed when accounting for the particle bed dynamics of a demonstration blast furnace hearth.

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