Modelling of magma flow in a volcanic conduit with liquid/gas mass exchange

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Abstract:

In this work we develop a liquid/gas model for magmatic flow in a volcanic conduit that describes the physical processes at the microscopic and macroscopic scales. The resulting two-phase model considers an incompressible liquid phase and a compressible gas phase that exchange mass. It also preserves the conservation of mass and momentum, and a dissipative energy balance under appropriate temperature equations for both phases compatible with thermodynamic theory.

Simulations of the 1D version of the model show promising results for real applications.