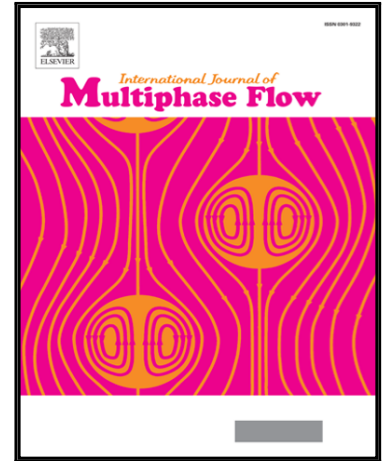


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Direct numerical simulations of gas-solid-liquid interactions in dilute fluids

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**Highlights**

- A virtual laboratory has been developed to capture the complex flow interactions between gas bubbles and rigid particles immersed in a Newtonian liquid at variable temperature.
- This virtual laboratory can help to improve the understanding of the nonlinearities that arise in the dynamics of natural multiphase systems like lava and ice flows.
- This virtual laboratory is applicable across a wide range of fluid-dynamics regimes and robust for extreme viscosity contrasts that may arise.

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