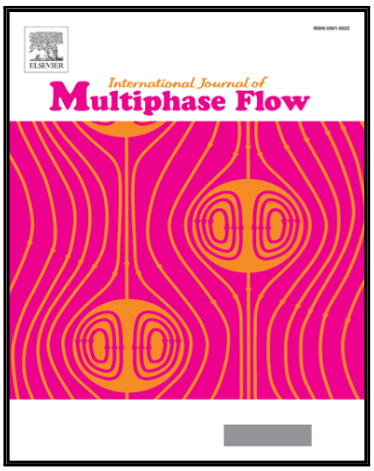


# Effect of Insoluble Surfactant on Turbulent Bubbly Flows in Vertical Channels

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**Highlights**

- Direct numerical simulation (DNS) of bubbles with the insoluble surfactant by using a fronttracking / finitevolume method.
- Elastic numbers of the surfactant are varied to study their effects on the collective motion of nearly spherical bubbles in a turbulent upflow in a vertical channel.
- The reduction in flow rate by clean noncoalescing bubbles from wall layers is largely eliminated by the addition of surfactants.
- The addition of surfactants changes the void fraction distribution and flow structure of the bubbly upflow in the turbulent channel.