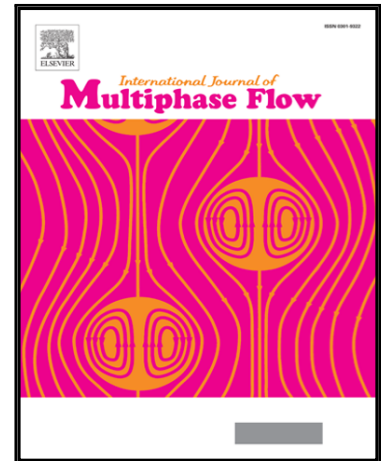


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Modelling of upwards gas-liquid annular and churn flow with surfactants in vertical pipes

A.T. van Nimwegen, L.M. Portela, R.A.W.M. Henkes

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Highlights

- A model is presented for vertical annular gas-liquid pipe flow with surfactants
- The model is based on momentum balances over the film and the gas core
- The film consists of a foam layer and a liquid lubrication layer
- Closure relations are proposed for: the interfacial friction, foam density, foam viscosity and liquid film thickness
- The model predictions match the experimental measurements to within 25%

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