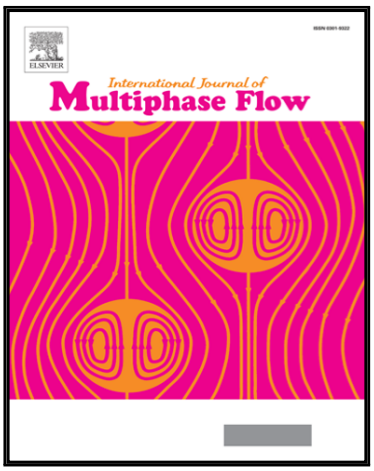

Detailed Numerical Simulation of Swirling Primary Atomization Using a Mass Conservative Level Set Method

Changxiao Shao , Kun Luo , Yue Yang , Jianren Fan

PII: S0301-9322(16)30620-6
DOI: 10.1016/j.ijmultiphaseflow.2016.10.010
Reference: IJMF 2489

To appear in: *International Journal of Multiphase Flow*

Received date: 13 May 2015
Revised date: 28 June 2016
Accepted date: 22 October 2016

Please cite this article as: Changxiao Shao , Kun Luo , Yue Yang , Jianren Fan , Detailed Numerical Simulation of Swirling Primary Atomization Using a Mass Conservative Level Set Method , *International Journal of Multiphase Flow* (2016), doi: 10.1016/j.ijmultiphaseflow.2016.10.010

Highlights

- We report detailed numerical simulations of swirling liquid atomization by using a recently developed mass conservative level set method.
- Through comparing the sheet thickness, the breakup length and the cone angle, the numerical convergence of the global characteristics of the swirling two phase flow has been obtained.
- The numerical results show that turbulent inflow can induce liquid sheet breakup near the nozzle exit, reduce the stiffness of the liquid sheet, and lead to the statistically homogeneous distribution of small-scale liquid structures in the radial direction.
- Compared with the single-phase jet, the two-phase jet exhibits the chaotic velocity filed downstream that can enhance the mixing of droplets and ambient gas, and the precessing vortex core (PVC) is not observed in the center of the two-phase jet.
- The preferential alignment of ω_i with the intermediate strain rate indicates that the fluctuating velocity in the recirculation zone is statistically similar to isotropic turbulence.