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Direct numerical simulation of impinging jets atomization

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Direct numerical simulation (DNS) based on the volume-of-fluid (VOF) method is performed to study the impinging jets atomization considering the effects of jet inflow velocity profiles and artificial turbulence on the break-down of impinged liquid sheets. Both the simulated flow patterns and the statistical atomization feature of droplet size distribution agree well with the experimental data from the literatures. The disintegration of impinged sheet can result from the unstable aerodynamic or impact waves. Although the contribution of the two types of waves is not fairly well quantified, the simulation indicates that the impact waves dominate the breakup of the liquid sheet over a wide range of ambient pressures. Effects of the jet inflow conditions including mean velocity profile and fluctuations on the atomization process were investigated by comparing the temporal variations of velocity and turbulent kinetic energy, as well as the wave frequency. The inflow velocity profile determines the wave frequency and the distribution of impact waves characterized by different amplitudes in the sheet, but the inflow velocity fluctuations, via augmenting or reducing the artificial disturbance in the jets, only dominates the amplitude of impact waves.

Biography

Bing Wang worked as a Visiting Researcher at Technological University of Munich as a Humboldt Fellow. He is now the Vice Deputy Director of School of Aerospace Engineering, Tsinghua University. He has published more than 40 papers in reputed journals and has been serving as an Editorial Board Member of *Journal of Engineering*. His research interests include fundamentals of turbulent combustion and multiphase flows, combustion instabilities and new conception propulsion, combined cycle power (RDBCC, RBCC, TBCC) and scramjets.

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