

Liquid mixing intensification by adding swirling flow in the transverse jet mixer

Bin Wu¹, Chunhui Li¹, Mengxue Zhang¹, and Peicheng Luo¹

¹Southeast University

November 9, 2020

Abstract

In this study, effect of swirling addition on the liquid mixing behavior of multi-orifice-impinging transverse jet mixer has been investigated by planar laser induced fluorescence as well as large eddy simulation (LES). In the case of swirling addition into the jet flow, there exists an optimized swirling jet angle or optimized jet-to-cross velocity ratio for the fixed mixer configuration. A larger swirling jet angle will make the flow dominated by the swirling, resulting in a slower mixing process. Interaction of swirling crossflow with no-swirling injected streams, or with swirling injected streams in the opposite direction is beneficial for the mixing. LES predictions show that many small vortices are produced homogenously due to intensified impingement in the case of opposite swirling directions, leading to a relative fast mixing process in several milliseconds. Whereas the mixing is restrained when the swirling directions of two flows are the same.

Hosted file

Luo_Mixing intensification_swirling_20201105.pdf available at <https://authorea.com/users/292609/articles/491625-liquid-mixing-intensification-by-adding-swirling-flow-in-the-transverse-jet-mixer>