

多相流

非牛顿型流体雾化时气体射流动能利用率

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摘要

关键词 [动能利用率](#) [雾化](#) [预成膜](#) [雾化器](#) [非牛顿型流体](#)

分类号

KINETIC ENERGY EFFICIENCY OF AIR STREAM IN ATOMIZING NON-NEWTON LIQUID

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Abstract

Kinetic energy efficiency of atomizing air, by C is the ratio of the effective energy required for atomization to the kinetic energy of the atomizing air. The present study analyzes the variation of C with the Reynolds number of atomizing air stream, Ohnesorge number and air to liquid mass ratio. Atomization of non-Newtonian fluids with viscosity up to $4.4 \text{ Pa}\cdot\text{s}$ is carried out by using a specially designed prefilming airblast atomizer. Drop sizes are measured by using laser diffraction technique. For liquids with low viscosities, impingement of air stream on the liquid film dominates the atomization process and film thickness exercises only minor influence on C ; while for liquids with high viscosities, disintegration of liquid film is made by the impingement of air stream on the liquid film and the wavy movement of film, and C is higher for thinner liquid film in the same operation conditions. The shear force on the surface of liquid film formed by swirling atomizing air plays an important role in the atomization of film in the conditions of low air velocities and low liquid viscosities and its influence on atomization gradually weakens with increasing atomizing air velocity and liquid viscosity. Eventually impinging on the liquid film dominates the atomization process.

Key words [kinetic energy efficiency](#) [atomization](#) [prefilming](#) [atomizer](#) [non-Newtonian fluids](#)

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