World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:10, No:05, 2016

# Bubbling in Gas Solids Fluidization at a Strouhal Number Tuned for Low Energy Dissipation

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**Abstract :** Gas solids multiphase flow is common in many engineering and environmental applications. Turbulence and multiphase flows are two of the most challenging topics in fluid mechanics, and when combined they pose a formidable challenge, even in the dilute dispersed regime. Dimensionless numbers are important in mechanics because their constancy can imply dynamic similarity between systems, despite possible differences in medium or scale. In the fluid mechanics literature, the Strouhal number is usually associated with the dimensionless shedding frequency of a von Karman wake; here we introduce this dimensionless number to investigate bubbling in gas solids fluidization. St=fA/U, which divides stroke frequency (f) and amplitude (A) by forward speed (U). The bubble behavior in a large two-dimensional bubbling fluidized bed (500mm×30mm×6000mm) is investigated. Our result indicates that propulsive efficiency is high and energy dissipation is low over a narrow range of St and usually within the interval 0.2<St<0.4. Due to least-action principle, we expect it to constrain the range of St that bubbles use.

**Keywords :** bubbles, Strouhal number, two-phase flow, energy dissipation
**Conference Title :** ICFD 2016 : International Conference on Fluid Dynamics
**Conference Location :** Amsterdam, Netherlands
**Conference Dates :** May 12-13, 2016

Open Science Index, Aerospace and Mechanical Engineering Vol:10, No:05, 2016 publications.waset.org/abstracts/45222.pdf