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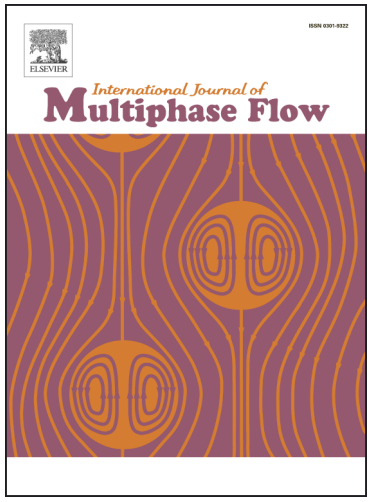

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Characterization of Fluidized Beds Hydrodynamics by Recurrence Quantification Analysis and Wavelet Transform

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Abstract

This paper reports the development of nonlinear time series analysis technique based on recurrence quantification analysis (RQA) method to characterize the hydrodynamic of gas-solid fluidized beds and a comparison with the obtained results by wavelet transform (WT) analysis method is made. An experimental work has been carried out at varying conditions, e. g. bed diameter (5, 9, 15 cm ID), particle size (150, 300 and 600 μm), bed height at aspect ratios (1, 1.5 and 2) and superficial gas velocities (ranging 0.1 to 1.7 m/s). Both methods show that by using larger particles and higher aspect ratios, the contribution of macro structures increases in the system. By increasing the gas velocity, finer structures in the bed first lose their contribution and after passing a transition velocity (of about 0.3, 0.5

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