

MULTI-SCALE CHARACTERISTICS OF VIBRATION ACCELERATION SIGNALS IN VAPOR-LIQUID-SOLID FLUIDIZED BED EVAPORATOR

Mingyan Liu, Collaborative Innovation Center of Chemical Science and Engineering (Tianjin), School of Chemical Engineering and Technology ; State Key Laboratory of Chemical Engineering, Tianjin University ;
China
myliu@tju.edu.cn

Min An, Xiaoping Xu , Collaborative Innovation Center of Chemical Science and Engineering (Tianjin), School of Chemical Engineering and Technology, Tianjin University, China

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In this work, the multi-value phenomenon of correlation dimension and its relationship with multi-scale flow behavior were investigated by using chaos analysis of time series of vibration acceleration as well as pressure drop obtained from vapor-liquid-solid fluidized bed evaporator. Modified methods of Grassberger & Procaccia were applied in the chaos analysis. Results indicate that multi- (generally three) value of correlation dimension in the pressure drop original signals results from the multi-scale behavior in the systems of vapor-liquid and vapor-liquid-solid flow boiling. However, only one value of correlation dimension can be found in the vibration acceleration original signals. The reason is that the energy of the high frequency vibration signal is very strong, and it can cover up the multi-scale phenomena. When the vibration acceleration signals were analyzed using the Daubechies 8 wavelet, the dual effects of solid particles on the local hydrodynamics can be obtained.