

Title Sequential modeling of fluidized bed paddy dryer
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Abstract

A sequential method was developed to model a continuous plug flow fluidized bed dryer. The method is based on dividing the dryer into sections in series with ideal mixing for both solid and gas phases in each section. In order to determine the proper number of sections, drying experiments were carried out using paddy at different operating conditions. It was shown that the number of sections can be correlated to Damköhler number, which includes kinetic and hydrodynamic parameters of the process. The model is able to predict the particle's moisture profile along the bed as well as the moisture content of dried product. It was shown that the model fits the experimental data satisfactorily with the correlation coefficient of 0.989. Moreover, the model was tested against available data in the literature at different scales and operating conditions for which an error of less than 4.5% was observed in predicting the paddy moisture content at the outlet.