

Title Modeling of the packed bed drying of paddy rice using the local volume averaging (LVA) approach
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Abstract

A transient heat and mass transfer model was developed for the packed bed drying of paddy rice using the local volume averaging method in this research. The required conditions for the application of the local volume averaging were evaluated including appropriate length, time, and temperature scales and justified for fixed bed paddy rice drying. Taking local thermal equilibrium in each representative elementary volume, transient mass and heat transfer governing equations were derived. The transport mechanisms considered were conduction and diffusion as well as convection heat and mass transfer. In the model, the transport coefficients were functions of moisture content and temperature, thus they changed during drying process. The governing heat and mass transfer equations were simultaneously solved using an implicit numerical method. The simulation results were compared to available experimental data from literatures. Although the physical properties were from different independent research and independent of the experimental data used for model validation, predicted results showed a reasonable agreement with the measured data.