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Determination of thermal diffusivity of persimmon flesh tissue using three-dimensional structure model based on X-ray computed tomography

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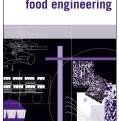
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14 Abstract

Computed tomography (CT) images were acquired for an intact fruit and the cell tissues of 15persimmon flesh using two types of X-ray CT devices. The relationship between the porosity 1617and mean CT value for small tissue samples having a volume of 0.3 mm x 0.3 mm x 0.3 mm was investigated. The three-dimensional microstructure of the issue was reconstructed using 1819 image processing software and heat transfer simulation was carried out based on the real 20structure model. The effective thermal conductivity of the tissue was determined by comparing 21the results of the three-dimensional (3D) model simulation with those of the homogeneous 22model simulation and was related to the porosity of the sample. The Brailsford model was 23selected as the most suitable model to predict the effective thermal conductivity of the tissue. 24The porosity, thermal conductivity and moisture distributions were visualized for an intact fruit 25based on analysis of high-resolution X-ray image.

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