

عنوان مقاله:

Prediction of Temperature and Moisture Variations within Iranian Bread during Baking in an Experimental Impinging Jet Oven

محل انتشار:

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خلاصه مقاله:

The baking process is the result of thermal processes like non-enzymatic browning, starch gelatinization and protein denaturation which involve heat and mass transfer inside the bread and to the ambient. In this study, considering both heat and mass transfer simultaneously, the moisture diffusion is modeled separately for liquid water and water vapor as well. The required boundary conditions in numerical modeling were acquired by measuring temperature at top and bottom surfaces of the bread at oven temperatures of 150, 172, 200, 225 and 250 C. The resulted equations were solved using Finite Difference Method (FDM) and solution was compared experimental results of flat bread baking in the experimental impinging jet oven developed by the same authors. The results showed that the moisture content of the bread at top and bottom surfaces of the bread decreases while it increases at internal, so cooler, parts of bread. These variations are in agreement with theory of vaporization-condensation of water inside the porous media. The results of the numerical solution were employed in training of a Neural Network (NN) which predicted the bread temperature with MRE and MAE of 2.06% and 1.82 and moisture content with MRE of 12.47% and 0.017, (respectively Based on testing data

کلمات کلیدی:

Modeling, Neural Network, Simultaneous Heat and Mass Transfer

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