Basic Study on Relaxation of Uneven Heating in an Industrial Microwave Oven

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While foods are sterilized by being heated in a industrial microwave oven, uneven heating occurs inside the heated foods. This becomes a problem as the unheated part gets no sterilization and the overheated part causes deterioration of foods.

In this paper, a microwave oven was modeled based on an industrial one and model solution (starchy solution and salted starchy solution) simulated food as heated materials. Distribution of absorption power inside the heated materials in the industrial microwave oven was analyzed using parallel FDTD method, and the absorption power is substituted for heat transfer equation to analyze temperature distribution inside the heated materials. Figs. 1 and 2 show the analytical model of the industrial microwave oven used in parallel FDTD method. Figs. 3 and 1 show analysis results of temperature distribution. Refering to Figs. 3 and 1, it is confirm that parts of cup's edge is heated by the addition of sodium chloride. The tendency of the temperature distribution of the model solution was obtained and the fundamental data of the uniform appertization was provided.

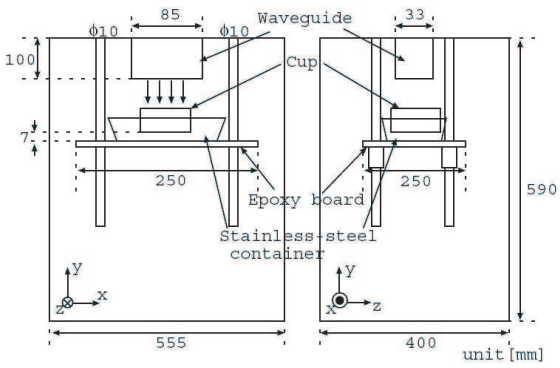

Figure 1: Analytical model.

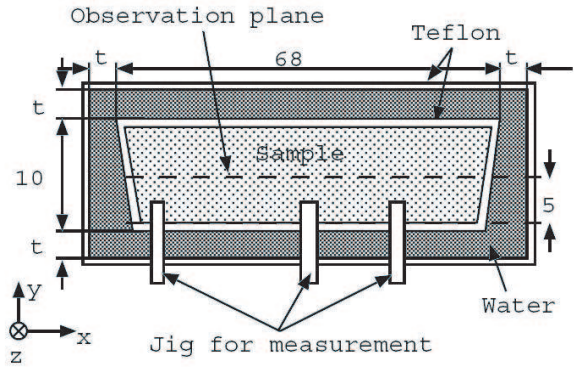

Figure 2: Cup for samples.

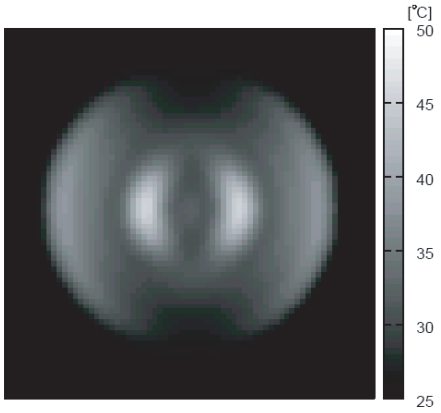

Figure 3: Temperature distribution of starchy solution (water film: 0 mm).

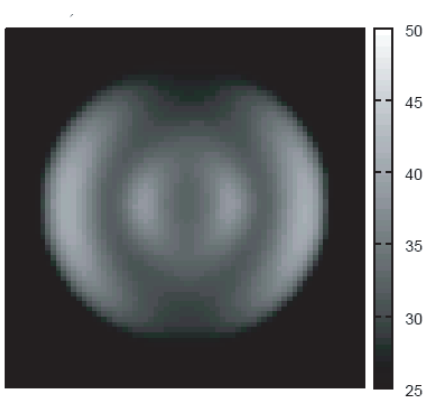

Figure 4: Temperature distribution of salted starchy solution (water film: 0 mm).