

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

SOLVING TEMPERATURE OF MICROWAVE
HEATING FOR MOIST FOODSTUFFS BY USING
DECOMPOSITION METHOD

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ABSTRACT

The development of science and engineering are related with the mathematics and mathematicians. This relationship especially prominent in the case of electromagnetic theory and microwave engineering. This research study about how to find a temperature profile for a moist foodstuff in a microwave heating. This temperature is derived from Lambert Law and Maxwell Equation. This research use decomposition method in order to solve the equation temperature profile which is involve orthogonal series expansion. This research show the graph of temperature profile for a moist foodstuffs based on Lambert's Law approximation which is it is a best approximation according to the other researcher.

1 INTRODUCTION

A microwave oven is a kitchen apparatus that warms and cooks food by presenting it to microwave radiation in the electromagnetic range. The process of dielectric heating is where the induces polar molecules in the food to pivot and produce thermal energy. Nowadays, with the creation of the microwave and with the acceptance of fast food restaurants in the society, food has turned out to be more less demanding to get ready than ever. In addition, On food preparation, time and vitality can be saved. No one can deny that the microwave oven helps save time on food preparation. In this way, the microwave oven is important because family members can spend less time in the kitchen and more time in living room. The microwave oven spares time for families as well as for the service business. In such a quick paced world, individuals require all the more quick service and fast dinners. Without the handy part of microwave oven, nothing from what was just mentioned should be possible. Time, cash and vitality have been spared; our general public is profiting more by the modern use of microwave oven.

1.1 Research Background

Microwave heating is very famous in the food industries as well as in home and workplace to warm up foodstuffs shortly (Hossan & Dutta (2012)). The food industry is the biggest user of microwave energy, where it can be employed for cooking, thawing, tempering, drying, freeze-drying and sterilization, baking, heating and re-heating (Cui et al. (2004)). Compared to conventional hot air drying, microwave drying is rapid, more uniform and energy efficient also, the benefit of microwave drying include space saving and energy efficiency, since most of the electromagnetic energy is converted into heat and also the advantage of microwave application for drying is internal heat generation (Haghi & Amanifard (2008)).

For the rectangular wavelength of microwaves used in cooking, the difference in the tem-