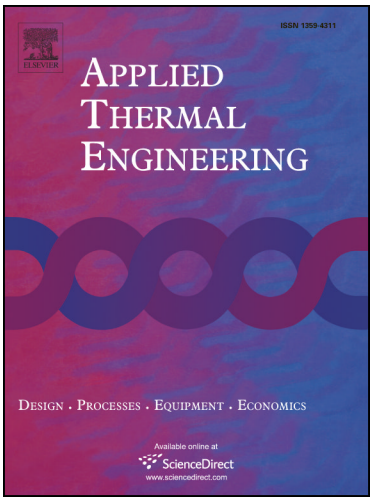

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PII: S1359-4311(17)34857-3
DOI: https://doi.org/10.1016/j.applthermaleng.2017.12.008
Reference: ATE 11529

To appear in: *Applied Thermal Engineering*

Received Date: 24 July 2017
Revised Date: 9 November 2017
Accepted Date: 2 December 2017

Please cite this article as: Z. Tang, T. Hong, Y. Liao, F. Chen, J. Ye, H. Zhu, K. Huang, Frequency-selected Method to Improve Microwave Heating Performance, *Applied Thermal Engineering* (2017), doi: https://doi.org/10.1016/j.applthermaleng.2017.12.008

Frequency-selected Method to Improve Microwave Heating Performance

Zhengming Tang[1], Tao Hong[1], Yinhong Liao[2], Fangyuan Chen[3], Jinghua Ye[2], Huacheng Zhu[2], and Kama Huang[2,*]

1. School of Electronic and Information Engineering, China West Normal University, Nanchong 637002, China
2. College of Electronics and Information Engineering, Sichuan University, Chengdu 610064, China
3. State Key Laboratory of ELectromagnetic Environment, China Aerospace and Science Technology Corporation, Shanghai 200090, China

Corresponding author: Kama Huang E-mail: kama_huang@yeah.net

Microwave heating has been widely used in various fields during recent years. However, it also has a common problem of uneven heating. In this paper, a novel method of optimal selected frequencies is proposed to improve the heating performance. On the basis of integral equation theory, the heating uniformity on small changes in microwave frequency is studied analytically. The results show that the heating performance depends highly on microwave frequencies. Due to the fact that some frequencies should contribute more to improving heating performance than others, the proposed method employing the optimal selected frequencies during the heating process. The Finite Element Method (FEM) is used to simulate the heating process and assess the performance. Results show that frequency-selected method can improve heating uniformity and heating efficiency effectively, which is also verified by experiment.

Key words: microwave heating; integral equation theory; optimal selected frequencies; heating uniformity; thermograms.

1. Introduction

Microwave heating has attracted extensive attention of the public because of its convenience and high efficiency [1-3]. However, in a multimode cavity, microwave heating usually leads to non-uniform temperatures, due to different factors including microwave waveguide location, object composition, geometry and placement of object inside the cavity [4-7]. Non-uniform heating may cause hot spots and thermal runaway, which not only restricts