

Accepted Manuscript

Title: Dynamic modulation of voltage excitation angle to optimize energy consumption of refrigerator

Author: Ho-Chiao Chuang, Kuan-Lin Wu, Wei-Bin Weng, Chen-Ta Lee

PII: S0140-7007(17)30228-1

DOI: <http://dx.doi.org/doi: 10.1016/j.ijrefrig.2017.05.028>

Reference: IJIR 3659

To appear in: *International Journal of Refrigeration*

Received date: 4-10-2016

Revised date: 22-4-2017

Accepted date: 30-5-2017

Please cite this article as: Ho-Chiao Chuang, Kuan-Lin Wu, Wei-Bin Weng, Chen-Ta Lee, Dynamic modulation of voltage excitation angle to optimize energy consumption of refrigerator, *International Journal of Refrigeration* (2017), <http://dx.doi.org/doi: 10.1016/j.ijrefrig.2017.05.028>.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Dynamic modulation of voltage excitation angle to optimize energy consumption of refrigerator

Ho-Chiao Chuang^{1*}, Kuan-Lin Wu¹, Wei-Bin Weng², Chen-Ta Lee²

¹*Department of Mechanical Engineering, National Taipei University of Technology, Taipei, 10608, Taiwan.*

Email: hchuang@mail.ntut.edu.tw

Tel.: +886 2 27712171 ext. 2076, Fax: +886 2 27317191

²*Ya De Li Technology Co., Ltd. Taipei, 10453, Taiwan (aka Power Asia Technology Co., Ltd. Taiwan)*

Tel.: +886 2 25872582, Fax: +886 2 25872570

*Corresponding Author: Ho-Chiao Chuang (Professor)

E-mail: hchuang@mail.ntut.edu.tw

Tel.: +886-2-2771-2171 ext. 2076

Fax: +886-2-2731-7191

Address: Department of Mechanical Engineering
National Taipei University of Technology
No. 1, Sec. 3, Chung-Hsiao E. Rd.
Taipei 10608
Taiwan

Abstract

This study presents a dynamic modulation of voltage excitation angle technology, applied to a refrigerator so that the refrigerator operates at an optimum energy consumption. This technique utilizes a semiconductor element, Tri-electrode AC switch (TRIAC), as a regulatory element for modulating the voltage excitation angle and the sensing current is taken as the feedback signal to determine the voltage modulation range. Thus, a novel energy saving controller (NESC) was successfully developed. We validated the feasibility of the proposed NESC; tests were performed where the door is closed for one hour and a dynamic simulation of normal use where the door is opened and closed periodically in one hour. The energy-saving rates obtained were 20.48% and 12.88%, respectively. In addition, a long period of one day tests on refrigerator was also conducted w/o NESC, and the best power consumption was measured at 6.597kWh 24h-1. An energy-saving rate of 22.41% was achieved.

Keywords: Refrigerator, voltage excitation angle, TRIAC, energy consumption, energy saving

Download English Version:

<https://daneshyari.com/en/article/5017049>

Download Persian Version:

<https://daneshyari.com/article/5017049>

[Daneshyari.com](https://daneshyari.com)