

## Accepted Manuscript

Prediction of Acoustic Wave Parameters of Thermoacoustic Prime mover through Artificial Neural Network Technique: Practical Approach for Thermoacoustics

Anas A. Rahman, Xiaoqing Zhang

PII: S2451-9049(18)30388-3

DOI: <https://doi.org/10.1016/j.tsep.2018.09.002>

Reference: TSEP 232

To appear in: *Thermal Science and Engineering Progress*

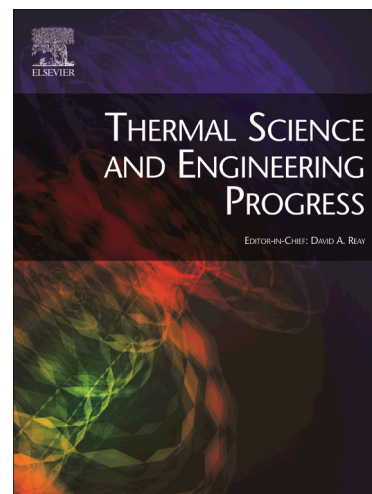
Received Date: 16 May 2018

Revised Date: 3 September 2018

Accepted Date: 3 September 2018

Please cite this article as: A.A. Rahman, X. Zhang, Prediction of Acoustic Wave Parameters of Thermoacoustic Prime mover through Artificial Neural Network Technique: Practical Approach for Thermoacoustics, *Thermal Science and Engineering Progress* (2018), doi: <https://doi.org/10.1016/j.tsep.2018.09.002>

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.



1 **Prediction of Acoustic Wave Parameters of Thermoacoustic Prime mover**  
2 **through Artificial Neural Network Technique: Practical Approach for**  
3 **Thermoacoustics**

4 Anas A. Rahman<sup>a, b</sup>, Xiaoqing Zhang<sup>a, \*</sup>

5 <sup>a</sup> Department of Refrigeration & Cryogenics, Huazhong University of Science and  
6 Technology, Wuhan 430074, China

7 <sup>b</sup> Department of Mechanical Engineering, Future University in Egypt, End of 90th st.,  
8 Fifth settlement, New Cairo, Cairo, 11835, Egypt

9 \* Corresponding author. Email: zhangxq@mail.hust.edu.cn; Tel: +86 27 8754 2718;

10 Fax: +86 27 8754 0724.

11

12 **Abstract**

13 Thermoacoustic prime movers are considered new alternative heat engines to  
14 traditional ones. For good performance of such a heat engine, a careful apparatus  
15 design is required. To predict the acoustic wave parameters responding to  
16 geometrical parameters of stack and resonator, is important for such a design.  
17 Artificial neural network (ANN) model is first proposed to predict the oscillating  
18 frequency and acoustic pressure amplitude, under given resonator length, stack  
19 length, stack plate spacing and thickness. ANN models for one standing wave  
20 thermoacoustic primemover had been developed based on published experimental  
21 data, and evaluated based on some criteria such as least mean square error between  
22 the predicted and actual outputs during the testing phase. Concerning oscillating  
23 frequency, ANN model with the configuration of 4-4-4-1 was adopted whilst 4-4-1  
24 for acoustic pressure amplitude, namely 4 neurons representing the four input design

Download English Version:

<https://daneshyari.com/en/article/10122799>

Download Persian Version:

<https://daneshyari.com/article/10122799>

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