

MASS SPECTROMETRY IMAGING IN DETECTING TUMOR HETEROGENEITY

By:

Ibrahim Elsayed

Donia Abd Elslam

Renad Taher

Mariem Ahmed

Mustafa Yehia

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the

Requirements for the Degree of

BACHELOR OF SCIENCE

in

Systems and Biomedical Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY

GIZA, EGYPT

2021

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Under the Supervision of

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GIZA, EGYPT

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Acknowledgments

Dedication

You may include this section if you wish to dedicate your thesis to someone.

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Abstract

1. : Introduction

1. : Literature Review
2. : Results

You are free to use any font type and size within your figures and tables provided that they are clear enough to the reader. For large size tables, you may separate them into several pages. For large size figures that cannot be resized to fit an A4 size paper without the loss of clarity, you may use larger size papers provided that they are properly folded to the A4 size and firmly bonded with the rest of the thesis.

* 1. Location and citation

Figures and tablesshould be included in the main text as close to the point of their introduction as possible. For figure captions use 12 point Times New Roman, bold, centered; place below the figure, use spacing of 12 points above and 24 points below. Leave two blank lines between the figure and the text above it.



Figure 3.1: Example figure for demonstration

For table captions use 12 point Times New Roman, bold, centered; place above the table, use spacing of 24 points above and 12 points below. Leave two blank lines between the figure and the text above it.

Table3.1: Example table for demonstration

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Table3.2: Another example wide table for demonstration

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* 1. Additional section

Discussion

In this research, the common industrial problem of ….;

Conclusions and future work

References

Bouwkamp, J.G., and Bolhom, J.K, 1963, “Dynamic Response of a Two- Story Steel Frame Structure “ , Bulletin of the Seismological Society of America , Vol.56, No. 6, Dec.,1963 , pp. 1289- 1303.

Newmark , N.M ., and Resenblueth E., 1971, Fundamentals of Earthquake Engineering, Vol. xx, 2nd edition,Prentice – Hall Inc ., Englewood cliffs , N.J.

Caravani, P., and Thomson, W. T., 1973, “Identification of Damping Coefficients from System Response “, Proceedings of the Fifth World Conference on Earthquake Engineering, Rome, Italy.

Ruiz , P ., and Penzien , J ., 1969, “Probabilistic Study on the Behavior of Structures During Earthquake “ , Earthquake Engineering Research Center Report No . EERC 69-3, University of California, Berkeley, Calif, Mar..

INFORMS web site, January 2012, <http://www.informs.org>.

Ibrahim, M., 2012, “A parametric study on …”, MSc. Thesis, Faculty of Engineering, Cairo University, Giza, Egypt.