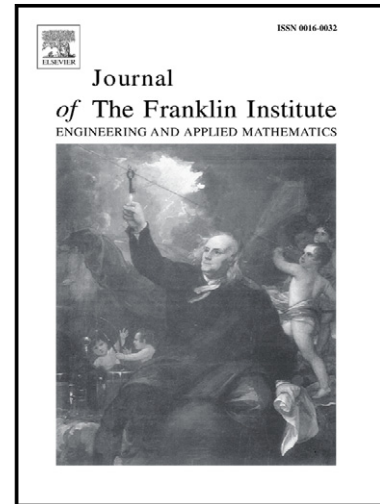


Author's Accepted Manuscript

2014 Benjamin franklin medal in mechanical engineering PRESENTED TO ALI HASAN NAYFEH, PH.D. of VIRGINIA POLYTECHNIC INSTITUTE & STATE UNIVERSITY BLACKSBURG, VIRGINIA, USA UNIVERSITY OF JORDAN AMMAN, JORDAN

C. Nataraj, Robert F. Moritz



PII: S0016-0032(15)00194-5
DOI: <http://dx.doi.org/10.1016/j.jfranklin.2015.05.019>
Reference: FI2341

To appear in: *Journal of the Franklin Institute*

Cite this article as: C. Nataraj, Robert F. Moritz, 2014 Benjamin franklin medal in mechanical engineering PRESENTED TO ALI HASAN NAYFEH, PH.D. of VIRGINIA POLYTECHNIC INSTITUTE & STATE UNIVERSITY BLACKSBURG, VIRGINIA, USA UNIVERSITY OF JORDAN AMMAN, JORDAN, *Journal of the Franklin Institute*, <http://dx.doi.org/10.1016/j.jfranklin.2015.05.019>

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 galley proof before it is published in its final citable 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.

2014 BENJAMIN FRANKLIN MEDAL IN MECHANICAL ENGINEERING

PRESENTED TO

ALI HASAN NAYFEH, PH.D.

of

VIRGINIA POLYTECHNIC INSTITUTE & STATE UNIVERSITY
BLACKSBURG, VIRGINIA, USAUNIVERSITY OF JORDAN
AMMAN, JORDAN

Sponsor: C. Nataraj, Ph.D., Mr. & Mrs. Robert F. Moritz, Sr. Endowed Chair Professor in Engineered Systems, Villanova University, VILLANOVA, PA 19087

ABSTRACT

It is now well recognized that all natural and many man-made systems are dynamic, and also that many of them exhibit nonlinear phenomena. Mathematical models for these systems, which are approximate representations, could be linear or nonlinear. Nonlinear models are significantly different from more conventional linear models both qualitatively and quantitatively. Typical nonlinear phenomena not predictable by linear analysis include multiple equilibria, instabilities, limit cycles, bifurcations and chaotic motion. Hence, in order to be able to analyze and design practical systems accurately and safely, nonlinear modeling and analysis techniques are necessary.

INTRODUCTION

Ali Hasan Nayfeh's research includes the development of novel analytical and numerical techniques and the discovery of some new nonlinear phenomena. Beginning in the 1960s, when he wrote a pioneering paper on the multiple scales procedure (which is in the class of perturbation methods), Nayfeh went on to codify perturbation techniques and transform them from an ad-hoc technique to a well-founded research tool. The unifying language he introduced is now the world-wide standard for the use of perturbation techniques. He carried out groundbreaking research to exploit, rather than to try to eliminate, nonlinear phenomena in order to stabilize dynamic systems. Later, he demonstrated that some inter-modal transfers of energy are inherently dangerous and should be avoided in all situations. In particular, such transfers are applicable to missile and ship motions, pendulating motions of cargos being hoisted by cranes, dynamic responses of structures, sound propagation in ducts, transition from laminar to turbulent flow, cutting-tool chatter, and instabilities in electrical-power systems.

Email: NATARAJ@VILLANOVA.EDUNayfeh

Download English Version:

<https://daneshyari.com/en/article/4974156>

Download Persian Version:

<https://daneshyari.com/article/4974156>

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