

**Proceedings of ASME 2022
International Design Engineering
Technical Conferences and
Computers and Information in
Engineering Conference
(IDETC-CIE2022)**

Volume 10

34th Conference on Mechanical Vibration and Sound (VIB)

**August 14-17, 2022
St. Louis, Missouri**

Conference Sponsors
Design Engineering Division

Computers and Information
in Engineering Division

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Two Park Avenue * New York, N.Y. 10016

© 2022, The American Society of Mechanical Engineers, 2 Park Avenue, New York, NY 10016, USA
(www.asme.org)

All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of the publisher.

INFORMATION CONTAINED IN THIS WORK HAS BEEN OBTAINED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS FROM SOURCES BELIEVED TO BE RELIABLE. HOWEVER, NEITHER ASME NOR ITS AUTHORS OR EDITORS GUARANTEE THE ACCURACY OR COMPLETENESS OF ANY INFORMATION PUBLISHED IN THIS WORK. NEITHER ASME NOR ITS AUTHORS AND EDITORS SHALL BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR DAMAGES ARISING OUT OF THE USE OF THIS INFORMATION. THE WORK IS PUBLISHED WITH THE UNDERSTANDING THAT ASME AND ITS AUTHORS AND EDITORS ARE SUPPLYING INFORMATION BUT ARE NOT ATTEMPTING TO RENDER ENGINEERING OR OTHER PROFESSIONAL SERVICES. IF SUCH ENGINEERING OR PROFESSIONAL SERVICES ARE REQUIRED, THE ASSISTANCE OF AN APPROPRIATE PROFESSIONAL SHOULD BE SOUGHT.

ASME shall not be responsible for statements or opinions advanced in papers or . . . printed in its publications (B7.1.3). Statement from the Bylaws.

For authorization to photocopy material for internal or personal use under those circumstances not falling within the fair use provisions of the Copyright Act, contact the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, tel: 978-750-8400, www.copyright.com.

Requests for special permission or bulk reproduction should be addressed to the ASME Publishing Department, or submitted online at: <https://www.asme.org/publications-submissions/journals/information-for-authors/journalguidelines/rights-and-permissions>

ISBN: 978-0-7918-8631-1

CONTENTS

Proceedings of ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference Volume 10

34TH CONFERENCE ON MECHANICAL VIBRATION AND SOUND (VIB)

Dynamics and Waves in Solids and Metamaterials

- DETC2022-89402** **V010T10A001**
Experimental Verification of Pulse Shaping in Elastic Metamaterials Under Impact Excitation
Greg Dorgant, Washington DeLima, and Michael J. Leamy
- DETC2022-89422** **V010T10A002**
Dynamics of Interface Relocation in an Electroacoustic Su-Schrieffer-Heeger Topological Lattice
Sai Aditya Raman Kuchibhatla and Michael J. Leamy
- DETC2022-89745** **V010T10A003**
Dispersion Morphing in Highly-Reconfigurable Rotator Lattices
Lezheng Fang and Michael J. Leamy
- DETC2022-90025** **V010T10A004**
Topological Properties and Localized Vibration Modes in Quasiperiodic Metamaterials With Electromechanical Local Resonators
Joshua LeGrande, Mohammad Bukhari, and Oumar Barry
- DETC2022-90043** **V010T10A005**
Modular Design, Fabrication, and Experimental Exploration of Phononic Chains Incorporating Interchangeable, Nonlinear Unit Cells
Nehemiah Mork, Matthew Fronk, and Michael J. Leamy
- DETC2022-91070** **V010T10A006**
Multi-Stop Band Wave Propagation in a Honeycomb Metamaterial With Embedded Resonators
Mauro Murer, Walter Lacarbonara, and Giovanni Formica
- DETC2022-91109** **V010T10A007**
Analysis of a Nonlinear Locally Resonant Metamaterial With Resistance-Inductance Shunt
Arun Malla, Mohammad Bukhari, and Oumar Barry

Dynamics of Soft Media and Robotics

- DETC2022-90225** **V010T10A008**
Data-Driven Modeling of a Pneumatic Yoshimura-Origami Structure With Tunable Dynamics
Qiwei Zhang, Hongbin Fang, Jian Xu, and Suyi Li

Energy Harvesting

- DETC2022-89948** **V010T10A009**
Vibration Energy Harvester With Piecewise Linear Nonlinear Oscillator and Controllable Gap Size
Jacob Veney and Kiran D'Souza

DETC2022-91199 **V010T10A010**
Preliminary Modeling of Angle of Attack in Self-Rectifying Turbine Under High
Rotational Speed
Xian Wu and Lei Zuo

DETC2022-91285 **V010T10A011**
Modelling, Characterization and Testing of an Ocean Wave Powered Desalination
System
*Jia Mi, Xian Wu, Joseph Capper, Xiaofan Li, Ahmed Shalaby, Uihoon Chung, Raju
Datla, Muhammad Hajj, and Lei Zuo*

DETC2022-91303 **V010T10A012**
A Self-Reactive Ocean Wave Energy Converter With Winch-Based Power Take-Off:
Design, Prototype, and Experimental Evaluation
Mingyi Liu, Adam Bennett, Fujun Ruan, Xiaofan Li, Junhui Lou, Jia Mi, and Lei Zuo

DETC2022-91322 **V010T10A013**
Ocean Wave Energy Conversion of a Spar Platform Using a Nonlinear Inerter
Pendulum Vibration Absorber
Aakash Gupta and Wei-Che Tai

Fluid-Induced Vibrations

DETC2022-91195 **V010T10A014**
Analytical Periodic Oscillations in a Harmonically Excited Single-Degree-of-Freedom
Aerodynamical Oscillator
Bo Yu and Albert C. J. Luo

Industrial Applications of Vibration and Acoustics

DETC2022-90660 **V010T10A015**
Separation and Identification of Diesel Engine Noise Sources Based on Adaptive
Variational Mode Extraction
Junhong Zhang, Gengyi Lin, Xiaozhen Li, Qidi Zhou, and Jiwei Lin

Machine Learning Applications in Vibrations and Dynamics

DETC2022-88808 **V010T10A016**
A Deep Long Short-Term Memory Network for Bearing Fault Diagnosis Under Time-
Varying Conditions
Kai Zhou

DETC2022-90118 **V010T10A017**
Progress Towards Data-Driven High-Rate Structural State Estimation on Edge
Computing Devices
*Joud Satme, Daniel Coble, Braden Priddy, Austin R. J. Downey, Jason D. Bakos,
and Gurcan Comert*

Nonlinear Systems and Phenomena (VIB/MSNDC)

DETC2022-90884 **V010T10A018**
Parametric Analysis of the Nonlinear Dynamics of Cracked Cantilever Beams
Chia-Ling Hsu and Meng-Hsuan Tien

Passive and Active Control of Vibration, Shock, and Noise

- DETC2022-89205** **V010T10A019**
On the Effect of Nonlinear Energy Sink Damping in Seismic Vibration Attenuation
Eliot Motato and Fabio Guerrero
- DETC2022-89788** **V010T10A020**
Multi-Input Shaping for a Multi-Mode Vibratory Structure Using Deadbeat Control
Theory
Alok Sinha
- DETC2022-90616** **V010T10A021**
Parametric Analysis of Negative Capacitance Circuit for Enhanced Vibration
Suppression Through Piezoelectric Shunt
Ting Wang and Jiong Tang

Rotating Systems and Rotor Dynamics

- DETC2022-88382** **V010T10A022**
Modal Synthesis Method for Inter-Blade Dry-Friction Surface Angle Design of Turbine
Wheel for Vibration Suppression
Ludek Pesek, Pavel Snabl, and Chandra Shekar Prasad

Structural Damage Detection and Diagnostics

- DETC2022-91039** **V010T10A023**
Memetic Optimizer for Structural Damage Identification Using Electromechanical
Admittance
Yang Zhang, Kai Zhou, and Jiong Tang

Time-Delay Systems and Discontinuous Dynamical Systems

- DETC2022-90924** **V010T10A024**
On the Modelling Bases of In-Motion Dynamic Characterization of Flexible Structures
Subject to Friction and Position Control Delay
Zsolt Iklódi, Xavier Beudaert, and Zoltan Dombvari

Vibration and Stability of Mechanical Systems

- DETC2022-91440** **V010T10A025**
Primary Resonance in a Weakly Forced Mathieu Equation With Parametric Damping
Jamal Ardister, Fatemeh Afzali, and Brian F. Feeny

Vibration of Continuous Systems

- DETC2022-88415** **V010T10A026**
Considerations for the Testing and Validation of a Mobile Damping Robot for
Overhead Power Lines
Andrew Choi, Paul-Camille Kakou, and Oumar Barry
- DETC2022-89962** **V010T10A027**
Frequency-Amplitude Response of Parametric Resonance of Electrostatically
Actuated MEMS Cantilever Beams Driven by Fringe Effect
Miguel A. Martinez and Dumitru I. Caruntu