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Lecturer

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Summary

My research interests are primarily in the field of nonlinear structural dynamics.

Motivation: The high-performance engineering industry is driven by the need for greater performance. Increasingly, this may only be achieved by designing structures to operate beyond the regimes where linearity can be assumed, and nonlinear behaviour must be accounted for. My research is motivated by the need to understand the effect of nonlinearity in engineering structures, and how it may be accounted for in the design process. My specific interests include nonlinear modelling and simulation, nonlinear modal interactions, and nonlinear system identification.

Nonlinear modelling and simulation: The useful properties of linear structures, such as modal orthogonality and superposition, cannot be extended to nonlinear systems. As such, many of the established techniques for linear models cannot be extended to nonlinear systems. My research includes the use of a variety of analytical and numerical techniques for nonlinear modelling and simulation.

Nonlinear modal interactions: Nonlinearity can lead to a variety of behaviour that is not seen in linear systems. This aspect of my research involves developing an understanding of the physical mechanisms that drive these behaviours.

Nonlinear system identification: A key step in the design and testing of engineering structures is the development of mathematical models describing the structures. Nonlinear system identification describes the process of generating nonlinear models based on experimental testing of a system. My research in this area includes the development of novel methods for the identification of nonlinear systems.

Biography

I received a BEng in Mechanical Engineering from the University of Bristol in 2012, before starting a PhD in the field of nonlinear dynamics, also at the University of Bristol. In 2015 I began work as a research associate, allowing me to further develop my doctoral research. Since 2017 I've held the position of lecturer, and continue work in the field of nonlinear dynamics.

Keywords

- Nonlinear dynamics
- Nonlinear modelling
- System identification

Memberships

Organisations

Department of Mechanical Engineering

Other sites

- Mecheng

Research Groups

- Applied Nonlinear Mathematics
- Dynamics and Control
- Dynamics and Control - Core

Recent publications

- Cao, C, Hill, TL, Conn, AT, Gao, X & Li, B, 2019, 'Nonlinear Dynamics of a Magnetically Coupled Dielectric Elastomer Actuator'. *Physical Review Applied*.
- Elliott, AJ, Cammarano, A, Neild, SA, Hill, TL & Wagg, D, 2019, 'Using frequency detuning to compare analytical approximations for forced responses'. *Nonlinear Dynamics*.
- Cao, C, Hill, T & Conn, A, 2019, 'On the nonlinear dynamics of a circular dielectric elastomer oscillator'. *Smart Materials and Structures*, vol 28.
- Ehrhardt, D, Hill, T & Neild, S, 2019, 'Experimentally measuring an isolated branch of Nonlinear normal modes'. *Journal of Sound and Vibration*, vol 457., pp. 213-226
- Fushimi, T, Marzo, A, Hill, T & Drinkwater, B, 2019, 'Enhancing dynamic positioning performance inside mid-air acoustic levitator'.
- Tartaruga, I, Elliott, A, Hill, T, Neild, S & Cammarano, A, 2019, 'The effect of nonlinear cross-coupling on reduced-order modelling'. *International Journal of Non-Linear Mechanics*, vol 116., pp. 7-17
- Wang, X, Hill, T & Neild, S, 2019, 'Frequency response expansion strategy for nonlinear structures'. *Mechanical Systems and Signal Processing*, vol 116., pp. 505-529
- Fushimi, T, Marzo, A, Drinkwater, B & Hill, TL, 2019, 'Acoustophoretic Volumetric Displays using a Fast-Moving Levitated Particle'. *Applied Physics Letters*, vol 115.
- Wang, X, Hill, T, Neild, S, Shaw, AD, Khodaparast, H & Friswell, MI, 2018, 'Model updating strategy for structures with localised nonlinearities using frequency response measurements'. *Mechanical Systems and Signal Processing*, vol 100., pp. 940-961
- Fushimi, T, Hill, TL, Marzo, A & Drinkwater, BW, 2018, 'Nonlinear trapping stiffness of mid-air single-axis acoustic levitators'. *Applied Physics Letters*, vol 113.

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