



Professor Weidong Zhu

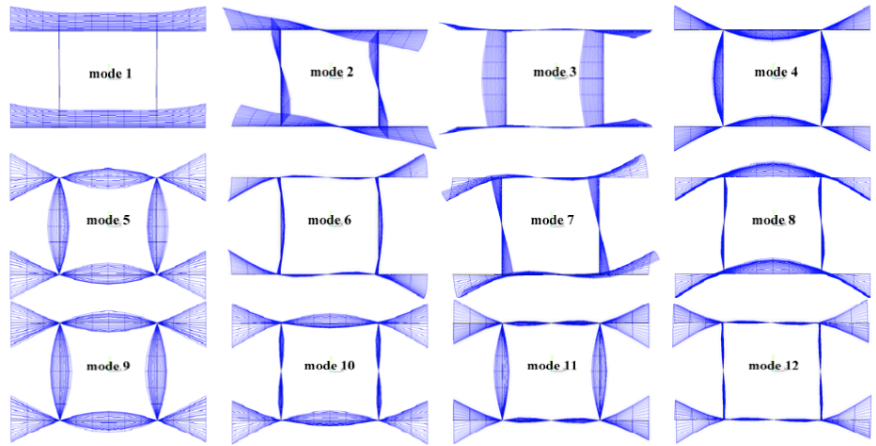


Figure 3. Axial projections of the first 12 modal shapes of the thin-walled structure with a branched, doubly symmetric cross-section.

From: Lei Zhang, Aimin Ji, Weidong Zhu, and Liping Peng, “On the Identification of Sectional Deformation Modes of Thin-Walled Structures with Doubly Symmetric Cross-Sections Based on the Shell-Like Deformation”, *Symmetry*, Vol. 10, pp 759-, 2018

See:

<https://me.umbc.edu/dr-weidong-zhu/>

<https://scholar.google.com/citations?user=j2pU3OAAAAAJ&hl=en>

https://www.researchgate.net/profile/W_Zhu2

Department of Mechanical Engineering
University of Maryland, Baltimore, Maryland USA (UMBC)

Education:

Ph.D., Mechanical Engineering, University of California at Berkeley, 1994

M.S., Mechanical Engineering, Arizona State University, 1988

Dual B.S., Mechanical Engineering and Computational Science, Shanghai Jiao Tong University, 1986

Research Interests, etc:

My research spans the fields of dynamics, vibration, control, applied mechanics, structural health monitoring, and wind energy, and integrates analytical development, numerical simulation, experimental validation, and industrial application. Much of the current research can be divided into three areas: 1) vibration and stability of distributed structural systems; 2) finite element modeling, modal testing, model updating, and structural damage detection; and 3) infinitely variable transmission and wind energy. In the first area, we have developed new methodologies for analyzing and controlling the vibration of linear and nonlinear, time-invariant and time-varying, distributed-parameter systems. In the second area, we have addressed some major challenges in model-based damage detection: accurate modeling of structures and inverse analysis for damage detection. In the third area, we are developing novel all-g geared infinitely variable transmission and variable electromotive-force generators.

My laboratories, the Dynamic Systems and Vibrations Laboratory in Room 236 of the Engineering Building and the Laser Vibrometry Laboratory in Room 233I of the Engineering building, have a state-of-the-art vibration measurement and analysis facility, and various specialized test stands have been developed in-house for experimental validation purposes. Our research has been supported by the federal and state government as

well as industry. In addition to training graduate and undergraduate students, the laboratory has provided outreach programs to K-12 students in the Baltimore region.

Classes Taught at UMBC:

Dynamics; Vibrations; Advanced control systems; Linear vibrations; Advanced dynamics; Nonlinear vibrations

Selected Publications:

- X. Zhao, B. Chen, Y.H. Li, W.D. Zhu, F.J. Nkiegaing, Y.B. Shao, "Forced vibration analysis of Timoshenko double-beam system under compressive axial load by means of Green's functions", *Journal of Sound and Vibration*, Vol. 464, 115001, 2020
- Yi Hui, Siu-Seong Law, Weidong Zhu, Qingshan Yang, "Extended IHB method for dynamic analysis of structures with geometrical and material nonlinearities", *Engineering Structures*, Vol. 205, 119984, 2020
- Mitao Song, Lei Chen, Jie Yang, Weidong Zhu, Sritawat Kitipornchai, "Thermal buckling and postbuckling of edge-cracked functionally graded multilayer graphene nanocomposite beams on an elastic foundation", *International Journal of Mechanical Sciences*, Vol. ?, 2019, (in press)
- Guimin Chen, Fulei Ma, Guangbo Hao and Weidong Zhu, "Modeling large deflections of initially curved beams in compliant mechanisms using chained beam constraint model", *ASME Journal of Mechanisms and Robotics*, Vol. 11, 011002, February 2019
- Lei Zhang, Weidong Zhu, Aimin Ji and Liping Peng, "A new approach to the identification of distortion modes of thin-walled structures based on plate/shell theory", *MATEC Web of Conferences*, Vol. 278, 03005, 2019
- Lei Zhang, Aimin Ji, and Weidong Zhu, "A Novel Approach to Perform the Identification of Cross-Section Deformation Modes for Thin-Walled Structures in the Framework of a Higher Order Beam Theory", *Applied Sciences*, Vol. 9, p 5196-, 2019
- Lei Zhang, Weidong Zhu, Aimin Ji, and Liping Peng, "A Simplified Approach to Identify Sectional Deformation Modes of Thin-Walled Beams with Prismatic Cross-Sections", *Applied Sciences*, Vol. 8, pp 1847-, 2018
- H. Ren, W. Fan and W.D. Zhu, "An accurate and robust geometrically exact curved beam formulation for multibody dynamic analysis", *ASME Journal of Vibration and Acoustics*, Vol. 140, 011012, February 2018
- W. Fan, W.D. Zhu, "An accurate singularity-free and locking-free formulation of a three-dimensional shear-deformable beam using Euler parameters", *International Journal of Non-Linear Mechanics*, Vol. 102, pp 136-146, 2018
- Yujia Hu, Hongtao Zhou, Weidong Zhu, Cheng Jiang, "Large deformation analysis of composite spatial curved beams with arbitrary undeformed configurations described by Euler angles with discontinuities and singularities", *Computers and Structures*, 2018 (in press)
- Lei Zhang, Aimin Ji, Weidong Zhu, and Liping Peng, "On the Identification of Sectional Deformation Modes of Thin-Walled Structures with Doubly Symmetric Cross-Sections Based on the Shell-Like Deformation", *Symmetry*, Vol. 10, pp 759-, 2018
- W. Fan and W.D. Zhu, "An accurate singularity-free geometrically exact beam formulation using Euler parameters", *Nonlinear Dynamics*, 15 December 2017
- W. Fan and W.D. Zhu, "A new locking-free formulation of a three-dimensional shear-deformable beam", *ASME Journal of Vibration and Acoustics*, Vol. 139, 051001, October 2017
- Lei Zhang, Weidong Zhu and Aimin Ji, "Application of Pattern Recognition to the Identification of Cross-Section Deformation Modes of Thin-Walled Structures", *IEEE Access*, 2017
- J. Liu, W.D. Zhu, P.G. Charalambides, Y.M. Shao, Y.F. Xu, X.M. Fang, "A dynamic model of a cantilever beam with a closed, embedded horizontal crack including local flexibilities at crack tips", *Journal of Sound and Vibration*, Vol.?, 2016 (in press)
- W. Fan and W.D. Zhu, "An accurate singularity-free formulation of a three-dimensional curved Euler-Bernoulli beam for flexible multibody dynamic analysis", *ASME Journal of Vibration and Acoustics*, Vol. 138, 051001, October 2016
- W. Fan, W.D. Zhu and H. Ren, "A new singularity-free formulation of a three-dimensional Euler-Bernoulli beam using Euler parameters", *ASME Journal of Computational and Nonlinear Dynamics*, Vol. 11, 041013, July 2016
- H. Ren, W.D. Zhu and W. Fan, "A nonlinear planar beam formulation with stretch and shear deformations

under end forces and moments”, *International Journal of Non-Linear Mechanics*, Vol. 85, pp 126-142, 2016

LIU Jing, ZHU Weidong, CHARALAMBIDES Panos G, SHAO Yimin, XU Yongfeng, WU Kai, and XIAO Huifang, “Four-Beam Model for Vibration Analysis of a Cantilever Beam with an Embedded Horizontal Crack”, *Chinese Journal of Mechanical Engineering*, Vol. 108, 0901, 2015

C. J. Yang; W. D. Zhu; W. H. Zhang; X. H. Zhu; and G. X. Ren, “Determination of Pipe Pullback Loads in Horizontal Directional Drilling Using an Advanced Computational Dynamic Model”, *ASCE Journal of Engineering Mechanics*, Vol. 140, 04014060, 2014

Y.F. Xu, W.D. Zhu, J. Liu, Y.M. Shao, “Identification of Embedded Horizontal Cracks in Beams Using Measured Mode Shapes”, *Journal of Sound and Vibration*, 2014

L. Li, D.G. Zhang, W.D. Zhu, “Free vibration analysis of a rotating hub–functionally graded material beam system with the dynamic stiffening effect”, *Journal of Sound and Vibration*, Vol. 333, pp 1526-1541, 2014

Zhu, W.D., & Wu, K. (in press). Dynamic stability of a class of second-order distributed structural systems with sinusoidally varying velocities, *ASME Journal of Applied Mechanics*.

Zhu, W.D., Song, X.K., & Zheng, N.A. (2011). Dynamic stability of a translating string with a sinusoidally varying velocity,” *ASME Journal of Applied Mechanics*, 78, 061021.

Zhu, W.D., Ren, H., & Xiao, C. (2011). A nonlinear model of a slack cable with bending stiffness and moving ends with application to elevator traveling and compensation cables, *ASME Journal of Applied Mechanics*, Vol. 78, 041017.

He, K., & Zhu, W.D. (2011). Finite element modeling of structures with L-shaped beams and bolted joints. *ASME Journal of Vibration and Acoustics*, 133, 011010.

Xu, G.Y., & Zhu, W.D. (2010). Nonlinear and time-varying dynamics of high-dimensional models of a translating tensioned beam with a stationary load subsystem, *ASME Journal of Vibration and Acoustics*, 132, 061012.

He, K., & Zhu, W.D. (2009). Modeling of fillets in thin-walled beams using shell/plate and beam finite elements. *ASME Journal of Vibration and Acoustics*, 131, 051002.

Zhu, W.D. & Zheng, N.A. (2008). Exact response of a translating string with arbitrarily varying length under general excitation. *ASME Journal of Applied Mechanics*, 75, 031003.

Xu, G.Y., Zhu, W.D., and Emory, B.H. (2007). Experimental and numerical investigation of structural damage detection using changes in natural frequencies. *ASME Journal of Vibration and Acoustics*, 129, 686-700.

Zhu, W.D., Zheng, N.A., & Wong, C.N. (2007). A stochastic model for the random impact series method in modal testing, *ASME Journal of Vibration and Acoustics*, 129, 265-275.

Zhu, W.D., & Chen, Y. (2006). Theoretical and experimental investigation of elevator cable dynamics and control. *ASME Journal of Vibration and Acoustics*, 128, 66-78.

Zhu, W.D., Ni, J., & Huang, J. (2001). Active control of translating media with arbitrarily varying length. *ASME Journal of Vibration and Acoustics*, 123, 347-358.

Zhu, W.D., & Ni, J. (2000). Energetics and stability of translating media with an arbitrarily varying length. *ASME Journal of Vibration and Acoustics*, 122, 295-304.

Zhu, W.D., Guo, B.Z., Mote, Jr., C.D. (2000). Stabilization of a translating tensioned beam through a pointwise control force. *ASME Journal of Dynamic Systems, Measurement, and Control*, 122, 322-333.