



Professor Mohamad S. Qatu

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Director and Professor
School of Engineering and Technology
Central Michigan University

Education:

Ph.D., Engineering Mechanics, The Ohio State University, 1989

M.S., Engineering Mechanics, Ohio State University, 1986

B. Eng., Engineering (Honor), Yarmouk University, Jordan, 1985

MBA, Master of Business Administration (Certificate in Quality), 2002

Affiliations:

Fellow, American Society of Mechanical Engineers, since 2006, member since 1991

Fellow, Society of Automotive Engineers, since 2007, member since 1997

Member, American Society of Composites, since 2008

Member, American Society of Engineering Education, since 2008

Experience:

2011-Present, Director and Professor, School of Engineering and Technology, Central Michigan University, Mount Pleasant, Michigan

2008-2011, Professor, Mississippi State University, Mississippi State, Mississippi

2000-2008, Leader/Supervisor, Ford Motor Co, Dearborn, Michigan

1997-2000, NVH/CAE Senior Research Engineer, Dana Corporation, Auburn Hills, Michigan

1995-1997, Associate Professor, Mechanical Eng., Lake Superior State Univ., Sault Ste Marie, Michigan

1992-1995, Program Chairperson, Mechanical Engineering Tech., Franklin University, Columbus, Ohio

1989-1991, Test and Analysis Engineer, DRESSER Industries, Columbus, Ohio

1994, 1996 Summers, Consultant: SDRC, Honda of America

In addition, Dr. Qatu held appointments or received honorary recognition as adjunct/visiting and guest professor from Oakland University (USA), King Abdul Aziz University (Saudi Arabia), AnNajah University (Palestine) and Wuhan University of Technology (PR China).

Professional Interests:

Composite Structures, Shell Theory, Vibration, Automotive Engineering, Engineering Design
Specialty Areas

Performed research on theory and vibration of composite shells and plates, stress and buckling analysis, composite shafts, engine mount design, driveline vibrations, exhaust vibrations, design for six sigma, belt vibrations, powertrain bending, fluid-born noise (power steering) as well as other areas.

Research Summary

Professor Mohamad Qatu is passionate about the use of mechanics to solve engineering design problems, particularly in the area of vibrations. He worked on composite plates and shells and developed a theory for the analysis of deep laminated shells. His theory is proven to be more accurate than higher order theories for various types of shells. Dr. Qatu's book on vibration of laminated shells and plates is the first in the field. In addition, Dr. Qatu applied mechanics principles to study fluid born noise phenomenon in power steering lines. His apparatus and methods are widely used in the auto industry today. Dr. Qatu's work on various noise and vibration and harshness (NVH) phenomenon in automotive engineering is also recognized and frequently referenced in the engineering community. In particular, he is recognized for his work on driveline systems, engine mounts, exhaust systems, as well as others. Dr. Qatu used computer aided engineering tools like finite element method and others in his research.

Dr. Qatu has published more than 100 articles, most of which are in refereed journals. He is the editor in chief of the International Journal of Vehicle Noise and Vibration and on the editorial board on Composite Structures.

He also has two patents registered to his credit on noise suppression. He is a Fellow in both SAE and ASME. He is a registered professional engineer in various states.

Journal Editing:

Founder and Editor-In-Chief: International Journal of Vehicle Noise and Vibration, Inderscience

Member of the Editorial Board (since 2004): Journal of Composite Structures

Member of the Editorial Board (since 2010): Journal of Vibration and Control

Member of the Editorial Board (since 2010): Journal of Passenger Car– Mechanical Systems, Society of Automotive Engineers

Contributing Editor: Composites for the Pressure Vessel Industry, ASME-Pressure Vessels and Piping, Vol. 302, July, 1995.

Publications:

Books (4)

Vibration of Laminated Shells and Plates, pp 406, Elsevier (2004)

Road Vehicle Dynamics (with multiple authors), pp 852, SAE (2008)

Road Vehicle Dynamics: Problems and Solutions (with multiple authors), SAE (2010)

Vibration of Continuous Systems, with A. W. Leissa, , McGraw Hills (2011)

Patents and Prior Art (2):

Multi-Chamber and Tuned Pipe Systems for Fluid Borne Noise Attenuation. Patent No. 6155378, Approved December 5, 2000.

Air Bladder System for Attenuating Fluid Borne Noise, Prior Art No. 2002-0059959, 2002. Approved, May 2002.

Refereed Journal Publications (62):

Qatu, MS, "Free Vibration and Static Analysis of Laminated Composite Shallow Shells," Ph.D. Dissertation, Ohio State University, 212 pp., June 1989.

Qatu, MS, and A. W. Leissa, "Natural Frequencies for Cantilevered Doubly-Curved Laminated Composite Shallow Shells," Composite Structures, Vol. 17, No. 3, pp. 227-256, March 1991.

Leissa, AW and M. S. Qatu, "Equations of Elastic Deformation for Laminated Composite Shallow Shells," ASME, J. of Applied Mechanics, Vol. 58, No. 1, pp. 181-188, March 1991.

Leissa, AW and M. S. Qatu, "Stress and Deflection Analysis of Composite Cantilevered Shallow Shells," ASCE, J. of Engineering Mechanics, Vol. 117, No. 4, pp. 893-906, April 1991.

Qatu, MS, "Curvature Effects on the Deflection and Vibration of Cross- Ply Shallow Shells," Mechanics, Computing in 90's and Beyond, Eds. H. Adeli and R. Sierakowski, Vol. 2, pp. 746-750, May 1991.

Qatu, MS, "Free Vibration of Laminated Composite Rectangular Plates" Int. J. of Solids and Structures, Vol. 28, No. 8, pp. 941-954, August 1991.

Qatu, MS, and A. W. Leissa, "Free Vibration of Completely Free Doubly- Curved Laminated Composite Shallow Shells," J. of Sound and Vibration, Vol. 151, No. 1, pp. 9-29, Oct. 1991.

Qatu, MS, and A. W. Leissa, "Vibration Studies for Laminated Composite Twisted Cantilever Plates," Int. J. of Mechanical Sciences, Vol. 33, No. 11, pp. 927-940, November 1991.

Qatu, MS, "Mode Shape Analysis of Laminated Composite Shallow Shells," J. of the Acoustical Society of America, Vol. 92, No. 3, pp. 1509-1520, September 1992.

Qatu, MS, "Review of Shallow Shell Vibration Research," Shock and Vibration Digest, Vol. 24, No. 9, pp. 3-15, September 1992.

Qatu, MS, and A. Bataineh, "Structural Analysis of Shallow Shells Using CRAY Y-MP Supercomputers," Int. J. Computers and Structures, Vol. 45, No. 3, pp. 453-459, Nov 1992.

Qatu, MS, and A. W. Leissa, "Effects of Edge Constraints upon Shallow Shell Frequencies," Thin-Walled Structures, Vol. 14, pp. 347-379, Dec. 1992.

Qatu, MS, "Inplane Vibration of Slightly Curved Laminated Composite Beams," J. of Sound and Vibration, Vol. 159, No. 2, pp. 327-338, Dec. 1992.

Qatu, MS, and A. Leissa, "Buckling or Transverse Deflection of Unsymmetrically Laminated Plates Subjected to Inplane Loads," American Institute of Aeronautics and Astronautics J., Vol. 103, No. 1, pp. 189-194, January 1993.

Qatu, MS, "Vibrations of Doubly-Cantilevered Laminated Composite Thin Shallow Shells," Thin-Walled Structures, Vol. 15, No. 1, pp. 235-248, January 1993.

Qatu, MS, and A. Elsharkawy, "Vibrations of Laminated Composite Arches with Deep Curvature and Arbitrary Boundaries," Computers and Structures, Vol. 47, No. 2, pp. 305-311, June 1993.

Qatu, MS, "Theories and Analyses of Thin and Moderately Thick Laminated Composite Curved Beams," Int. J. of Solids and Structures, Vol. 30, No. 20, pp. 2743-2756, August 1993.

Qatu, MS, and A. W. Leissa, "Vibrations of Shallow Shells With Two Adjacent Edges Clamped and the Others Free," J. Mechanics of Structures and Machines, Vol. 21, No. 3, pp. 285-301, August 1993.

Qatu, MS, N. Jaber and A. W. Leissa, "Natural Frequencies for Completely Free Trapezoidal Plates," J. Sound and Vibration, Vol. 167, No. 1, pp. 183-191, October 1993.

Qatu, MS, "On the Validity of Nonlinear Shear Deformation Theories for Laminated Composite Plates and Shells," Composite Structures, Vol. 27, pp. 395-401, January 1994.

Qatu, MS., "Natural Frequencies for Cantilevered Laminated Composite Right Triangular and Trapezoidal Plates," Composite Science and Technology Vol. 51, pp. 441-449, June 1994.

Qatu, MS, and A. Algothani, "Bending Analysis of Laminated Plates and Shells by Different Methods," Computers and Structures, Vol. 52, No. 3, pp. 529-539, August 1994.

Qatu, MS, "Vibrations of Laminated Composite Completely Free Triangular and Trapezoidal Plates," Int. J. Mechanical Sciences Vol. 36, No. 9, pp. 797-809, September 1994.

Abu-Farsakh, G. and M. S. Qatu, "A Triangular Conforming Element for Laminated Shells," Thin-Walled Structures, Vol. 21, No. 1, pp. 31-42, Jan 1995.

Qatu, MS, "Vibration of Cantilevered Composite Triangular and Trapezoidal Doubly-Curved Shallow Shells," Acta Mechanica. Vol. 108, pp. 63-75, 1995.

Qatu, MS, "Natural Vibration of Free Laminated Composite Triangular and Trapezoidal Shallow Shells," Composite Structures. Vol. 31, No. 1, pp. 9-19, January 1995.

Qatu, MS, "Vibration Studies on Completely Free Shallow Shells Having Triangular and Trapezoidal Planforms," Applied Acoustics. Vol. 44, No. 3, pp. 215-231, March 1995.

Qatu, MS "Accurate Stress Resultant Equations for Laminated Composite Deep, Thick Shells," Composites for the Pressure Vessel Industry, ASME-PVP, Vol. 302, pp 39-46, 7, 1995.

Qatu, MS, "Vibration Analysis of Cantilevered Shallow Shells with Right Triangular and Trapezoidal Planforms," J. Sound and Vibration, Vol. 191, No. 2, pp. 219-231, February 1996.

Qatu, MS, "Accurate Theory for Laminated Composite Deep Thick Shells," Int. J. Solids and Structures, Vol. 36, No. 19, pp. 2917-2941, January 1999.

Qatu, MS, "Theory and Vibration Analysis of Laminated Barrel Thin Shells," J. Vibration and Control, Vol. 5, pp. 851-889, 1999.

- Qatu, MS, D. Llewellyn and W. Spadafora "Measurement of Steering Gear Impedance," *Experimental Mechanics*, Vol. 41, No. 2, pp. 151-156, 2001.
- Qatu, MS, "Recent Research Advances in the Dynamic Behavior of Shells. Part 1 : Laminated Composite Shells," *Applied Mechanics Reviews*. Vol 55, no 4, pp 325-350, 2002.
- Qatu, MS, "Recent Research Advances in the Dynamic Behavior of Shells. Part 2: Homogeneous Shells," *Applied Mechanics Reviews*. Vol 55, no 5, pp 415-434, 2002.
- Qatu, MS, and M. H. Sirafi, "Robustness of Powertrain Mount System for Noise, Vibration and Harshness at Idle," *Journal of Automobile Engineering*, Vol 216, pp 805-810, 2002.
- Qatu, MS, and A. Ghamat-Rezaei, "Industrial Based Senior Projects in Engineering Curriculum," *Int. J. of Innovation and Learning*, Vol. 1, No. 4, 2004.
- Qatu, MS, "Theory and Vibration Analysis of Laminated Barrel Thick Shells," *Journal of Vibration and Control*, Vol. 10, pp. 319-341, 2004.
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- Sheng, G., K. Liu, L. Brown, J. Otremba, J. Pang, M. Qatu, "A New Mechanism of Belt Slip Dynamic Instability and Noise in Automotive Accessory Belt Drive Systems," *Int. J. of Vehicle Noise and Vibration*, Vol 2, No. 4, pp. 305-316, 2006.
- Sirafi, M.H and M.S. Qatu, "Robustness of Mount Systems for Idle Nvh, Part I: Centre Of Gravity (Cg) Mounts," *Int. J. of vehicle noise and Vibration*, Vol 2, No. 4, pp. 317-333, 2006.
- Sirafi, M.H. and M.S. Qatu, "Robustness of Mount Systems for Idle NVH, Part II: Pendulum Mounts," *Int. J. of Vehicle Noise and Vibration*, Vol 2, No. 4, pp. 334-340, 2006.
- Sheng, G., K. Liu, Les Brown, J. Otremba, J. Pang, M. Qatu, "Chirp, squeal and dynamic instability of misaligned V-ribbed Belts in Automotive Accessory Belt Drive Systems," *Int. J. of Vehicle Noise and Vibration*, Vol 3, No 1, pp. 88 – 105, 2007.
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- Sheng, G, Zheng, H, Qatu, M.S, Dukkipati, R.V., "Modeling of Friction-Induced Noise of Timing Belt," *Int. J. Vehicle Noise and Vibration*, Vol. 4, No. 4, 285-303, 2008.

Qatu, M.S., Abdelhamid, M.K., Pang, J, and Sheng, G., "Overview of Automotive Noise and Vibration," Int. J. Vehicle Noise and Vibration, Vol. 5, No. 1/2, 1-35, 2009.

Dukkipati, RV, G Qie, J Zhu, M Qatu, "Vibrations and Instability in Automotive Front End Accessory Drive Belt System," SAE Int. J. of Passenger Cars. Vol. 2, No. 1, pp. 1222-1236, 2009.

Wang, J, Qatu, MS and Dukkipati, RV, "A Metric for Transaxle Rattle," Int. J. Vehicle Noise and Vibration, Vol. 5, No. 4, pp. 300-307, 2009.

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Iqbal, J, and Qatu, MS, "Transverse Vibration of a Three-Piece Shaft System Joined with Multiple Hinges," Int. J. Vehicle Noise and Vibration, Vol. 6, No. 1, pp. 73-89, 2010.

Qatu, MS, Sullivan, RW, Wang, W, "Recent Research Advances in the Dynamic Behavior of Composite Shells: 2000-2009," Composite Structures Vol. 93, pp 14–31, 2010.

Qatu, MS "Effect of Inplane Edge Constraints on Natural Frequencies of Simply Supported Doubly Curved Shallow Shells," Thin-Walled Structures , Vol.49, pp 797-803, July 2011.

Hajianmaleki, M, and Qatu, MS, "Book Chapter: Mechanics of Composite Beam" Book Chapter in "Composite Materials / Book 1," ISBN 978-953-307-218-0.

Qatu, M.S., "An Innovative Industrial-Related One Semester Capstone Course in Engineering," accepted for publication, International journal of Innovation and learning.

Qatu, MS and Asadi, E. "Vibration of Doubly Curved Shallow Shells with Arbitrary Boundaries, " accepted for publication, Applied Acoustics.

Qatu, MS, King, R, Shubailat, O, Wheeler, R, "Vehicle Design for Robust Driveline NVH Due to Imbalance and Runout Using a Monte Carlo Process," accepted for publication, SAE Int. J. of Passenger Cars.