

**Timothy L. Morse, Ph.D., P.E., CFEI**  
**Senior Engineer****Professional Profile**

Dr. Timothy L. Morse is a Senior Engineer in Exponent's Thermal Sciences practice. Dr. Morse specializes in the engineering analysis and experimental testing of thermal and flow processes and equipment. His project experience has included turbines, compressors, boilers, heat transfer systems, flammable liquids, and cryogenic liquids. Dr. Morse has performed engineering analysis for the oil and gas industry, ranging from natural gas extraction facilities to retail motor fuel stations. He also has experience with offshore facilities. Dr. Morse has performed analysis on wind farms and investigated failures in wind turbines. He has also applied his expertise to intellectual property matters involving thermal or flow processes.

Dr. Morse also applies his expertise to the investigation and prevention of fires, explosions, and equipment failures. He has conducted fire origin and cause analysis involving electrical appliances, consumer products, boilers, and other combustion equipment. Dr. Morse has also investigated the origin and cause of fires in motor vehicles, including post-collision motor vehicle fires. Dr. Morse has experience in the testing and analysis of HVAC systems and components, including the analysis of the production and spread of carbon monoxide. He has significant experience with instrumentation and experimental measurement techniques in flow and thermal systems, including flow visualization and flow velocity measurement with laser diagnostic and acoustic diagnostic methods.

Prior to joining Exponent, Dr. Morse was a graduate researcher in the Fluid Dynamics Research Laboratories at Cornell University. He has conducted research on the wakes of stationary and oscillating structures in a flow and particularly on how flow-induced vibration due to vortex shedding causes fatigue and failure of structures. A significant component to this research was extensive measurements and analysis of the fluid forcing on a structure in a flow, combined with detailed measurements of the wake flow field using Digital Particle Image Velocimetry (DPIV).

**Academic Credentials and Professional Honors**

Ph. D., Mechanical Engineering, Cornell University, 2009

M.S., Mechanical Engineering, Cornell University, 2007

B.E., Mechanical Engineering, The Cooper Union (*summa cum laude*), 2003

National Science Foundation Fellowship, 2004–2008; National Defense Science and Engineering Graduate Fellowship, 2004–2007; Ralph Bolgiano, Sr. Outstanding Teaching Assistant Award, Cornell University, 2006; Cornell University Graduate Fellowship, 2003; Tau Beta Pi Fellowship, 2003; New York Association of Consulting Engineers Scholarship, 2002; Tau Beta Pi Engineering Honor Society, 2002; Pi Tau Sigma Mechanical Engineering Honor Society, 2002

## **Licenses and Registrations**

Registered Professional Mechanical Engineer, California, #35464; Certified Fire and Explosion Investigator (CFEI) in accordance with the National Association of Fire Investigators; Hazardous Waste Operation and Emergency Response Certification, 29 CFR 1910.120

## **Publications**

Morse TL, Kytömaa HK. The effect of turbulence on the rate of evaporation of LNG on water. *Journal of Loss Prevention in the Process Industries* 2011; 24:791–797.

Morse TL, Williamson CHK. Steady, unsteady, and transient vortex-induced vibration predicted using controlled motion data. *Journal of Fluid Mechanics* 2010; 649:429–451.

Morse TL, Williamson CHK. Prediction of vortex-induced vibration response by employing controlled motion. *Journal of Fluid Mechanics* 2009; 634:5–39.

Morse TL, Williamson CHK. Fluid forcing, wake modes, and transitions for a cylinder undergoing controlled oscillations. *Journal of Fluids and Structures* 2009; 25(4):697–712.

Morse TL, Williamson CHK. The effect of Reynolds number on the critical mass phenomenon in vortex-induced vibration. *Physics of Fluids* 2009; 21(4):045105.

Somandepalli V, Morse TL. PIV in combustion systems. *Laser Diagnostics in Combustion*. Lackner M(ed), Verlag ProcessEng Engineering GmbH, 2009.

Morse TL. Investigating phenomena in vortex-induced vibration of a cylinder using controlled vibration. Ph.D. Thesis, Cornell University, 2008.

Morse TL, Govardhan RN, Williamson CHK. The effect of end conditions on the vortex-induced vibration of cylinders. *Journal of Fluids and Structures* 2008; 24:1227–1239.

Morse TL, Williamson CHK. Understanding mode transitions in vortex-induced vibration using controlled motion. *Proceedings, 9<sup>th</sup> International Conference on Flow-Induced Vibrations (FIV-2008)*, Prague, Czech Republic, 2008.

Kysar JW, Gan YX, Morse TL, Chen X, Jones ME. High strain gradient plasticity associated with wedge indentation into face-centered cubic single crystals: Geometrically-necessary dislocation densities. *Journal of the Mechanics and Physics of Solids* 2007; 55(7):1554-1573.

Morse TL, Williamson CHK. Understanding mode transitions in vortex-induced vibration using controlled vibration. *Proceedings, 5<sup>th</sup> Conference on Bluff Body Wakes and Vortex-Induced Vibration (BBVIV-5)*, Costa do Sauipe, Brazil, 2007.

Morse TL, Williamson CHK. Employing controlled vibrations to predict fluid forces on a cylinder undergoing vortex-induced vibration. *Journal of Fluids and Structures* 2006; 22:877–884.

Gan YX, Kysar JW, Morse TL. Cylindrical void in a rigid-ideally plastic single crystal II: Experiments and simulations. *International Journal of Plasticity* 2006; 22(1):39–72.

Morse TL, Williamson CHK. Employing controlled vibrations to predict fluid forces on a freely vibrating cylinder. Proceedings, 4<sup>th</sup> Conference on Bluff Body Wakes and Vortex-Induced Vibration (BBVIV-4), Santorini, Greece, 2005.

### **Presentations**

Morse TL, Kytömaa HK. Variations in the evaporation rate of a cryogenic liquid on a water surface. Mary Kay O'Connor Process Safety Center 2010 International Symposium. College Station, TX, October 2010.

Morse TL, Kytömaa HK. The effect of turbulence on the evaporation of cryogenic liquid spills on water. AIChE Spring Meeting, 10th Topical Conference on Natural Gas Utilization, San Antonio, TX, March 2010.

Morse TL, Williamson CHK. Understanding mode transitions in vortex-induced vibration using controlled motion. 9<sup>th</sup> International Conference on Flow-Induced Vibrations (FIV-2008), Prague, Czech Republic, 2008.

Morse TL, Williamson CHK. Understanding mode transitions in vortex-induced vibration using controlled vibration. 5<sup>th</sup> Conference on Bluff Body Wakes and Vortex-Induced Vibration (BBVIV-5), Costa do Sauipe, Brazil, 2007.

Morse TL, Williamson CHK. Employing controlled vibrations to predict fluid forces on a freely vibrating cylinder. 4<sup>th</sup> Conference on Bluff Body Wakes and Vortex-Induced Vibration (BBVIV-4), Santorini, Greece, 2005.

Morse TL, Williamson CHK. An investigation of wake mode transitions and amplitude jumps in vortex-induced vibration using controlled vibration. 60<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Salt Lake City, UT, 2007.

Morse TL, Williamson CHK. Understanding mode transitions in vortex-induced vibrations of a circular cylinders using controlled vibration. 59<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Tampa, FL, 2006.

Morse TL, Williamson CHK. Predicting the response of a cylinder undergoing vortex-induced vibration using controlled vibrations. 58<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Chicago, IL, 2005.

Morse TL, Williamson CHK. Forces on a cylinder with periodic transverse motion in a free stream. 57<sup>th</sup> Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics, Seattle, WA, 2004.

### **Peer Reviewer**

- *Journal of Fluids and Structures*
- *Journal of Wind Engineering*
- *International Journal of Heat and Fluid Flow*

### **Professional Affiliations**

- American Society of Mechanical Engineers
- National Fire Protection Association
- National Association of Fire Investigators