Exponent®
Engineering & Scientific Consulting

Jim Karnesky, Ph.D., P.E., CFEI

Managing Engineer | Thermal Sciences
Menlo Park
+1-650-688-6919 | jkarnesky@exponent.com

Professional Profile

Dr. Karnesky specializes in combustion, fluid mechanics, thermodynamics, and heat transfer. He performs origin and cause investigations of fires and explosions in various industrial, commercial and residential settings.

Dr. Karnesky has investigated several Loss of Containment events in the petrochemical industry, encompassing upstream, midstream, and downstream sectors.

He currently serves on the NFPA committees on agricultural dusts (NFPA 61) explosives (NFPA 495) and combustible dusts (NFPA 654). He has also performed risk assessments and failure investigations for various electrical and natural gas utilities. He has testified as an expert witness in both civil and criminal court.

Dr. Karnesky has used numerical and experimental methods to research the structural response to explosions in piping systems for the nuclear and chemical industries, including thermal stress, elastic wave propagation, and plastic deformation. He has performed experiments involving pulsed detonation, rotating detonation, and gas turbine engines. He has performed numerical modeling and experimental measurement of slurry entrainment and rheology for application to nuclear waste transport. He has performed experiments on flame quenching and the limits of flame propagation, as well as computational modeling of vented explosions. He has also performed experiments involving the detection of buried explosives.

Prior to joining Exponent, Dr. Karnesky was a research fellow at the Air Force Research Laboratory in Dayton, OH and an adjunct professor of mechanical and aerospace engineering at the University of Dayton. He has also worked as a researcher at FM Global Research and at the Pacific Northwest National Laboratory.

Academic Credentials & Professional Honors

Ph.D., Aeronautics, California Institute of Technology (Caltech), 2010

M.S., Aeronautics, California Institute of Technology (Caltech), 2004

B.S., Aeronautical and Mechanical Engineering, Rensselaer Polytechnic Institute, 2003

B.S., Mathematics, Rensselaer Polytechnic Institute, 2003

NRC Post-doctoral fellowship, 2011-2013

Hans Hornung Prize — Best oral thesis defense, Caltech 2010

GALCIT Fellowship, 2003-2004

Licenses and Certifications

40-Hour Hazardous Waste Operation and Emergency Response Certification (HAZWOPER)

Certified Fire and Explosion Investigator (CFEI)

Academic Appointments

Adjunct Professor, Mechanical and Aerospace Engineering, University of Dayton, 2010-2013

Instructor, Viterbi school of engineering - Aviation Safety & Security Program, University of Southern California, 2018-present

Professional Affiliations

ASME

Publications

Selected Publications

Karnesky J, Reza A, Xiouris C. Accidental Activation of an Emergency Rocket Flare and Evaluation of Ignition Mechanism Designs, ISEE, Denver, CO, January 2020

Reza A, Lieberman D, and Karnesky J. Engineering investigation of the October 3, 1997 fires at United Integrated Circuits Corporation in Hsinchu, Taiwan. Exponent Failure Analysis Associates, Supplemental Reports, October 2017, July 19 2018, July 26 2018, and June 2019

Christiansen EW, Karnesky J. Understanding Ignition: How One Spark Can Burn an Entire Forest. The Fire Continuum Conference: Preparing for the Future of Wildland Fire, Missoula, MT, May 2018.

Karnesky J, Christiansen EW. Ignition of wildland fuels by hot metal particles and droplets. 15th International Conference, Fire and Materials, San Francisco, CA, February 2017.

Reza A, Karnesky J. Engineering investigation of the Fushun China grain elevator explosion. Exponent Failure Analysis Associates, December 2014.

Hetrick TM, Morrison DR, Ramirez JC, Ott BA, Karnesky J. Analysis of flammable liquid ejection from a container following headspace vapor ignition. Proceedings, International Symposium on Fire Investigation Science and Technology, College Park, MD, National Association of Fire Investigators, Sarasota, FL, September 22-24, 2014.

Karnesky J, Damazo J, Chow-Yee K, Rusinek A, Shepherd JE. Plastic deformation due to reflected detonation. International Journal of Structures and Solids 2013 Jan; 50(1):97-110.

Naples A, Hoke J, Karnesky J, Schauer FR. Flowfield characterization of a rotating detonation engine. 51st AIAA Aerospace Sciences Meeting, Grapevine, TX, January 7-10, 2013.

Shank J, King P, Karnesky J, Schauer FR, Hoke J. Development and testing of a modular rotating

detonation engine. 50th AIAA Aerospace Sciences Meeting, Nashville, TN, January 9-12, 2012.

Karnesky J, Hoke J, Schauer FR. Pulse detonation engines in the choked flame regime. 23nd International Colloquium on the Dynamics of Explosions and Reactive Systems, Irvine, CA, July 24-29, 2011.

Damazo J, Shepherd JE, Chow-Yee K, Karnesky J. Deformation of coated stainless steel tubes from reflected detonation. Extended Abstract 257, 23nd International Colloquium on the Dynamics of Explosions and Reactive Systems, Irvine, CA, July 24-29, 2011.

Damazo J, Ziegler J, Karnesky J, Shepherd JE. Shock wave-boundary layer interaction in reflecting detonations. Abstract BAPS.2010.DFD.HX.2, 63nd Annual Meeting of APS Division of Fluid Dynamics, November 21-23, 2010. Bulletin of the American Physical Society 2010; 55(16).

Damazo J, Chow-Yee K, Karnesky J, Shepherd JE. Mitigating effect of polymer coating on deformation from non-ideal explosions. Presented at IMPLAST 2010, SEM Fall Conference, University of Rhode Island, Providence, RI, October 14-21, 2010.

Karnesky J, Damazo J, Ziegler J, Shepherd JE. Investigating Shock Wave-Boundry Layer Interaction Caused by Reflecting Detonations. Paper No.ISH117, 8th ISHPMIE, Yokohama, Japan, September 5-10, 2010.

Karnesky J, Damazo J, Shepherd JE, Rusinek A. Plastic response of thin-wall tubes to detonation. Proceedings, ASME Pressure Vessels and Piping Conference, Bellevue, WA, July 18-22, 2010.

Karnesky J, Damazo J, Shepherd JE. A model for the spatial and temporal distribution of pressure during ideal detonation reflection. Paper 09F-42, 2009 Fall Meeting of the Western States Section of the Combustion Institute University of California at Irvine October 26-27, 2009.

Karnesky J, Damazo J, Shepherd JE. Plastic deformation of tubes due to detonation. 22nd ICDERS, Minsk, Belarus, July 27-31, 2009.

Ciccarelli G, Hlouschko S, Johansen C, Karnesky J, Shepherd JE. The study of geometric effects on the explosion front propagation in a horizontal channel with a layer of spherical beads. Proceedings, Combustion Institute 2009; 32:2299-2306.

Karnesky J, Pitz WJ, Shepherd JE. Detonation in gaseous isopropyl nitrate mixtures. Paper 07F-40, 2007 Fall Meeting of the Western States Section of the Combustion Institute, Livermore, CA, October 16-17, 2007.

Karnesky J, Chatterjee P, Tamanini F, Dorofeev S. An application of 3D gasdynamic modeling for the prediction of overpressures in vented enclosures. Journal of Loss Prevention in the Process Industries 2007; 20(4-6):447-454.

Lee BJ, Huang W, Jackson S, Pintgen F, Karnesky J, Liang Z, Shepherd JE. Detonation propagation over long distances in small tubes. 31st Combustion Symposium, Heidelberg, Germany, August 2006.

Karnesky J, Moffett S, Shepherd JE. Explosion transmission through foam metal breather plugs. EDL report LMCO-1, Explosion Dynamics Laboratories, California Institute of Technology, December 2005.

Karnesky J, Koos E, Shepherd JE. Transmission of hexane-air explosions. Explosion Dynamics Laboratory Report FM2004.003, California Institute of Technology, August 2004.