

**Filippo Gavelli, Ph.D., CFEI****Head of Dispersion Consulting**

Phone: 301 915-9925

Email: fgavelli@gexcon.com

Mobile: 301 335-8885

Fax: 301 656-2953

Professional Profile

Dr. Filippo Gavelli is the Head of the Dispersion Consulting group at GexCon US, Inc. and specializes in the analysis of heat transfer and fluid flow phenomena, including multiphase flows and cryogenic fluids. He has 10 years of engineering consulting experience and nearly 20 years of experience in computational fluid dynamics (CFD) modeling, using several research and commercial codes. He applies his expertise to modeling the atmospheric dispersion of hazardous gaseous releases, and has extensive experience modeling hazard scenarios for Liquefied Natural Gas (LNG) facilities, including vapor cloud dispersion, pool fires and vapor cloud deflagrations; his experience includes more than 20 LNG installations worldwide, including onshore and offshore (FLNG) facilities for LNG import, export (liquefaction) and peakshaving. He was the lead in the model validation effort that led to FLACS' approval by the U.S. DOT under 49 CFR 193, Dr. Gavelli is the lead author of several LNG safety-related papers and has been a regular contributor to LNG-related technical committees and expert panels for several years.

Dr. Gavelli also applies his expertise to the investigation of fires and explosions. He investigated numerous residential fires involving electrically powered consumer products, as well as fires involving all major modes of transportation. He also has performed several studies modeling fires in buildings as well as outdoors, for the purpose of evaluating fire growth, temperature distribution, and the spread of smoke, toxic gases and particulates.

Dr. Gavelli is responsible for GexCon US' dispersion modeling activities, which include risk assessments and consequence modeling for chemical and petrochemical facilities, offshore installations, hazardous materials transportation and various other applications. Dr. Gavelli's work has also been applied to accident investigations and in the forensic arena. GexCon US' dispersion modeling studies are performed using the world-leading FLACS software, developed by GexCon.

Dr. Gavelli's doctoral and post-doctoral research focused on the study of multiphase flows in Pressurized Water Reactors during a Loss-Of-Coolant-Accident (LOCA) and the modeling and analysis of turbulent flows in complex geometries. He developed and performed experimental campaigns to examine boiling and rapid condensation phenomena in nuclear reactor piping and to perform high-resolution measurements of fluid mixing in the reactor downcomer.

Academic Credentials

Ph.D., Mechanical Engineering, University of Maryland, College Park, 1997

B.S., Nuclear Engineering (cum laude), University of Bologna (Italy), 1993

Licenses and Certifications

Licensed Professional Engineer, Italy

Certified Fire and Explosion Investigator (CFEI) in accordance with the National Association of Fire Investigators (NAFI) National Certification Board per NFPA 921 Section 11.6.4

Fire Investigation 1A Certification accredited by the California State Fire Marshal

GexCon US Inc 7735 Old Georgetown Rd, Suite 1010 Bethesda, MD 20814, USA	Phone: +1 301 915-9940 Fax: +1 301 656-2953	GexConUS@gexcon.com	http://www.gexconus.com
---	--	---------------------	---

Professional Affiliations

Member, NFPA Technical Committee on Liquefied Natural Gas, responsible for NFPA 59A (*Standard for the Production, Storage and Handling of Liquefied Natural Gas*)

Member, NFPA Technical Committee on Hydrogen Technologies, responsible for NFPA 2 (*Hydrogen Technologies Code*)

Languages

Italian (native)

Publications

Gavelli, F, Davis, SG, Hansen, OR. Evaluating the Potential for Overpressures from the Ignition of an LNG Vapor Cloud during Offloading, *J Loss Prev Proc Ind*, 24(6): 908-915, 2011

Gavelli, F., Davis, S.G., Ichard, M. & Hansen, O.R., CFD simulation of gas dispersion from large-scale toxic chemical releases in complex environments, 14th Mary Kay O'Connor Process Safety Center International Symposium, 2011: 132-148

Bratteteig, A., Hansen, O.R., Gavelli, F. & Davis, S.G. (2011). Using CFD to analyze gas detector placement in process facilities. 2011 Mary Kay O'Connor Process Safety Center, International Symposium, College Station, Texas, 25-27 October 2011: 735-753.

Hansen, O.R., Gavelli, F., Davis, S.G. & Middha, P., Equivalent cloud methods used for explosion risk and consequence studies, 14th Mary Kay O'Connor Process Safety Center International Symposium, 2011:78-106

Gavelli, F, Davis, S.G., Hinze, P. & Hansen, O.R., CFD modeling of hydrogen releases and explosions, 7th Global Congress on Process Safety, AIChE 2011 Spring Meeting,

Ichard, M., Hansen, O.R., Middha, P., Royle, M., Willoughby, D. & Gavelli, F. (2011). CFD computations of liquid hydrogen releases. Fourth International Conference on Hydrogen Safety, San Francisco, California, 12-14 September 2011

Hansen, O. R.; Davis, S. G. & Gavelli, F. Use of CFD in onshore facility explosion siting studies *Hazards XII*, 2011, IChemE Symposium Series No. 156: 20-27

Hansen, OR, Gavelli, F, Ichard, M, Davis, SG, Validation of FLACS against experimental data sets from the model evaluation database for LNG vapor dispersion, *J Loss Prev Proc Ind*, 23:867-877, 2010.

Gavelli, F, Computational fluid dynamics simulation of fog clouds due to ambient air vaporizers, *J Loss Prev Proc Ind*, 23(6): 773-780, 2010.

Hansen, OR, Gavelli, F, Abiven, R, Xian-Sheng, S, Huan, L, LNG safety study using FLACS CFD-tool. Proceedings, 3rd World Conference on Safety of Oil and Gas Industry (WCOGI 2010), Beijing, China, Sept. 26-27, 2010.

Davis, SG, Engel, D, Gavelli, F, Hinze, PC, Hansen, OR. Advanced Methods for Determining the Origin of Vapor Cloud Explosions Case Study: 2006 Danvers Explosion Investigation. Proceedings, International Symposium on Fire Investigation Science and Technology, Hyattsville, MD, 2010.

Gavelli, F, Davis, SG, Hansen, OR. A Modern Tool for the Investigation of Indoor Flammable Gas Migration. Proceedings, International Symposium on Fire Investigation Science and Technology, Hyattsville, MD, 2010.

Gavelli, F, Chernovsky, M, Bullister E, Kytomaa H, Modeling of LNG spills into trenches, *J Hazard Mat* 2010; 180(1-3):332-339.

Gavelli, F, Davis, SG, Hansen, OR, A Unified Model for LNG Pool Spread and Vapor Dispersion: Is Wind Scoping Really A Factor?, AIChE Spring National Meeting, 2010.

- Gavelli, F, Davis, SG, Hansen, OR, Ichard, M, CFD Simulation of Vapor Dispersion from LNG Jetting and Flashing Releases, AIChE Spring National Meeting, 2010.
- Gavelli, F, Computational Fluid Dynamics Simulation of Fog Clouds due to Ambient Air Vaporizers, Proceedings of 2009 Mary Kay O'Connor Process Safety Center International Symposium.
- Gavelli F, Chernovsky, M, Kytomaa H. Quantification of Source-Level Turbulence during LNG Spills onto a Water Pond. J Loss Prev Proc Ind, 2009; 22(6):809-819
- Gavelli F, Liquefied Natural Gas explosion hazards: are they real? Hydrocarbon World, 2009; 4(1).
- Ponchaut, N, Chernovsky MK, Gavelli F, Kytomaa H. Modeling the spreading of large LNG spills on water. AIChE Spring National Meeting, 2009.
- Gavelli F, Chernovsky MK, Kytomaa H. Modeling pool fire hazards from large-scale LNG spills. Explor Prod Mag 2008; 6(2).
- Gavelli F, Bullister E, Kytomaa H. Applications of CFD to LNG spills into geometrically complex environments. J Hazard Mat 2008; 159:158–168. Also in : Proceedings, 2006 Mary Kay O'Connor Process Safety Center International Symposium, pp. 468–485.
- Gavelli, F., Large Eddy Simulation of LNG vapor dispersion, Proceedings, 26th UIT National Heat Transfer Conference, Palermo, Italy, June 2008.
- Kytomaa H, Chernovsky MK, Gavelli F. A new experimental study on the spreading of liquefied nitrogen over water. Proceedings, 2008 Offshore Technology Conference, May 2008.
- Gavelli F, Chernovsky MK, Kytomaa H. LNG pool fire models: Similarities and differences. Proceedings of the 2008 AIChE Spring National Meeting, April 2008.
- Gavelli F, Kytomaa H. Liquefied Natural Gas transportation. Proceedings, Marine Safety & Security Council, the Coast Guard Journal of Safety at Sea, Fall 2005; 62(3):33–36.
- Kytomaa H, Gavelli F Studies of LNG spills over water point up need for improvement. Oil and Gas Journal, May 9, 2005.
- Gavelli F, Clarke C, Tsuji J, Long RT. Fire and toxicity aspects of polyurethane foams. Proceedings, Polyurethane Foam Association Spring Meeting and Technical Program, Washington, DC, 2005.
- Gavelli F, Foulds J, Sire R, Kytomaa H. Root cause analysis of a gas turbine compressor stator blade failure. ASME Power Conference, Chicago, IL, 2005.
- Gavelli F, Kiger KT. Boron mixing in complex geometries: Flow structure details. Nuclear Engineering and Design 2001; 208:67–85.
- Kiger KT, Gavelli F. Optical measurements of boron dilution transients in the downcomer of a pressurized water reactor. 19th Nat. Conference on Heat Transfer (UIT), Modena, Italy, 2001.
- Muscio A, Tartarini P, Gavelli F. Measurement of the thermal diffusivity of thin slab specimens by the lock-in heating-cooling method. 19th Nat. Conference on Heat Transfer (UIT), Modena, Italy, 2001.
- Muscio A, Gavelli F, Tartarini P. Numerical simulation of the cooling effect of multiple droplets on a hot solid surface. International Conference on Multiphase Flows, New Orleans, LA, 2001.
- Kiger KT, Gavelli F. Boron mixing experiments using a laser induced fluorescence technique. Nuclear Engineering and Design 2000; 195:13–25.
- Muscio A, Tartarini P, Gavelli F. On-site measurement of thermal diffusivity by infrared thermography and thermoelectric equipment. 18th National Conference on Heat Transfer (UIT), Torino, Italy, 2000.
- Boyd C, Gavelli F, Kiger KT. CFD predictions and experimental data for downcomer mixing of an infinite slug in a rapid boron dilution transient. 8th International Conference on Nuclear Engineering (ICONE-8), Baltimore, MD, 2000.

- Gavelli F, Ruffino P, Anderson G, diMarzo M. Evaporative cooling and thermal fire detectors response. 17th National Conference on Heat Transfer (UIT), Ferrara, Italy, 1999.
- Gavelli F, diMarzo M. Effect of condensing surface on the pressurization rate of a PWR during HPI refilling. 16th National Conference on Heat Transfer (UIT), Siena, Italy, 1998.
- Gavelli F, diMarzo M. Effects of a geometric discontinuity on the mixing of a pumped liquid volume in PWR geometry. 6th Int'l Conference on Nuclear Engineering (ICONE-6), San Diego, CA, 1998.
- Gavelli F, diMarzo M, Almenas K. Resumption of natural circulation during post-BCM refilling in a B&W raised-loop PWR. National Heat Transfer Conference, Baltimore, MD, 1997.
- Almenas K, diMarzo M, Gavrilas M, Tafreshi A, Gavelli F. Scaling of thermally differentiated flows in primary system flow geometries. National Heat Transfer Conference, Baltimore, MD, 1997.
- Tartarini P, Gavelli F, Lorenzini G. Numerical analysis of air pressure waves in railroad tunnels. *Tecnica Italiana* 1994; 94(3):183–193 (in Italian).

Selected Invited Presentations and Courses

- Gavelli, F, Davis, SG, Gas Explosion Hazards for LNG Facilities, an Advanced Course. Doha, Qatar, Oct. 4-5, 2011.
- Davis, SG, Gavelli, F, Hansen, OR, van Wingerden, K, Rogstadkjernet, L. Gas Explosion Hazards on Offshore Facilities, an Advanced Course. College Station, TX, Aug.30-31, 2010 & May 15-16, 2011.
- Gavelli, F. Application of numerical simulation models to explosion investigations. Presented at the University of Trieste, Italy, May 6, 2010.
- Gavelli, F. LNG receiving terminals: separating the truth from myths. Presented at the University of Trieste, Italy, March 25, 2009.
- Gavelli, F. LNG Fire and Vapor Dispersion Hazards. Presented at the workshop “Liquefied Natural Gas Maritime Transportation – Practices and Developments”, Quebec City, Canada, June 4, 2008.
- Gavelli F. Engineering consulting and forensic applications of CFD models. Presented at the University of Trieste, Italy, September 13, 2007.
- Gavelli F. New developments in LNG vapor dispersion modeling. Presented at LNG Safety Workshop, LNG Tech Global Summit 2007, Rotterdam, Netherlands, Sep.10, 2007.
- Gavelli F. Evaluating risk and damages in fire protection engineering. Presented at 2007 National Fire Protection Day, University of Modena, Italy, June 26, 2007.
- Gavelli F. Applications of the fluent model to LNG spills over water. Presented at GTI seminar on LNG Safety: The Status of Computational Fluid Dynamic (CFD) Models for LNG Exclusion Zones, Houston, TX, September 13, 2006.
- Gavelli F, Clarke C. Fire and toxicity aspects of polyurethane foams. Presented at 2005 Polyurethane Foam Association Spring Meeting and Technical Program, Washington, DC, May 2005.

Technical Reports

- Gavelli F, Ruffino P, Anderson G, diMarzo M. The effect of minute water droplets on a simulated sprinkler link thermal response. NIST GCR 99-776, 1999.

Prior Experience

- Senior Manager in Exponent's Thermal Sciences practice, Exponent Failure Analysis Associates, Bowie, MD (2002-2009)
- Assistant Professor, Department of Mechanical Engineering, The Catholic University of America, Washington, DC (1999-2002)

Lecturer, Department of Mechanical Engineering, The Catholic University of America, Washington, DC
(1997-1999)

Research Associate, Department of Mechanical Engineering, University of Maryland, College Park, MD
(1997-1999)

Peer Reviewer

Reviewer for Journal of Hazardous Materials, Journal of Loss Prevention in the Process Industry and
Journal of Atmospheric Environment, Journal of Industrial and Chemical Engineering.