Stephanie Alexandra Coronel

Curriculum Vitae (December 2021)

Contact Information

Explosives Technologies
Sandia National Laboratories
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Education

California Institute of Technology — Pasadena, California
Graduate Aerospace Laboratories — *2009-2016*
Ph.D., Aeronautics, June 2016
Dissertation: "Thermal Ignition Using Moving Hot Particles"
M.S., Aeronautics, June 2010

University of Texas at Arlington — Arlington, Texas
Department of Mechanical and Aerospace Engineering — *2005-2009*
B.S., Aerospace Engineering, May 2009

Academic/National Laboratory Positions

Sandia National Laboratories — Albuquerque, New Mexico
Postdoctoral Appointee — *April 2018-Present*
I investigate the response of energetic materials, e.g., explosives, to abnormal environments through experimental development and data analysis, and numerical simulations. I'm particularly interested in the ignition behavior of the material as well as the subsequent development of a reactive front. I use high-speed diagnostics including Photonic Doppler Velocimetry, high-speed imaging, and microwave interferometry to quantify the material response.

California Institute of Technology — Pasadena, California
Postdoctoral Scholar — *June 2017-March 2018*
I designed and constructed a novel experiment to investigate the ignition of flammable gaseous mixtures by water-hammer type events in pipes. This study was partially funded by the Nuclear Regulatory Commission to understand the cause of accidental explosions in nuclear power plants.

California Institute of Technology — Pasadena, California
Postdoctoral Scholar — *July 2016-August 2016*
I trained a graduate student in the image processing techniques and experiment that I developed as a PhD student.

Industry Positions

The Boeing Company
Research Engineer (September 2016−May 2017)

Journal Publications

[A1] Michael L. Hobbs, Michael J. Kaneshige, and **Stephanie A. Coronel**, "Operability Thresholds for Thermally Damaged EBW Detonators." *Combustion and Flame*, accepted for publication.

[A2] Yakun Zhang, **Stephanie A. Coronel**, and Rémy Mével. "Numerical Study of Synthetic Spherically Expanding Flames for Optimization of Laminar Flame Speed Experiments." *Fuel*, 310 Part B (15): 122367, 2022.

[A3] Michael L. Hobbs, Michael J. Kaneshige, and **Stephanie A. Coronel**. "Vented and sealed cookoff of powdered and pressed ε-CL-20." *Journal of Energetic Materials*, 39(4): 432-451, 2021.

[A4] **Stephanie A. Coronel** and Michael J. Kaneshige. "Response of PETN detonators to elevated temperatures." *Proceedings of the Combustion Institute*, 38(3): 4271-4279, 2021.

[A5] **Stephanie A. Coronel**, Jean-Christophe Veilleux, and Joseph E. Shepherd. "Ignition of stoichiometric hydrogen-oxygen by water hammer." *Proceedings of the Combustion Institute*, 38(3): 3537-3545, 2021.

[A6] **Stephanie A. Coronel**, Josué Melguizo-Gavilanes, Rémy Mével, and Joseph E. Shepherd. "Experimental and Numerical Study on Moving Hot Particle Ignition." *Combustion and Flame*, 192: 495-506, 2018.

[A7] **Stephanie A. Coronel**, Josué Melguizo-Gavilanes, Silken Jones, and Joseph E. Shepherd. "Temperature Field Measurements of Thermal Boundary Layer and Wake of Moving Hot Spheres using Interferometry." *Experimental Thermal and Fluid Science*, 90: 76-83, 2018.

[A8] Josué Melguizo-Gavilanes, Rémy Mével, **Stephanie A. Coronel**, and Joseph E. Shepherd. "Effects of differential diffusion on ignition of stoichiometric hydrogen-air by moving hot spheres." *Proceedings of the Combustion Institute*, 36(1): 1155-1163, 2017.

[A9] Josué Melguizo-Gavilanes, **Stephanie A. Coronel**, Rémy Mével, and Joseph E. Shepherd. "Dynamics of ignition of stoichiometric hydrogen-air mixtures by moving heated particles." *International Journal of Hydrogen Energy*, 42(11): 7380-7392, 2017.

[A10] Josué Melguizo-Gavilanes, Augustin Nové-Josserand, **Stephanie A. Coronel**, Rémy Mével, and Joseph E. Shepherd. "Hot Surface Ignition of n-Hexane-Air Mixtures Using Simplified Kinetics." *Combustion Science and Technology*, 188(11-12): 2060-2076, 2016.

[A11] Rémy Mével, Urszula Niedzielska, Josué Melguizo-Gavilanes, **Stephanie A. Coronel**, and Joseph E. Shepherd. '"Chemical Kinetics of n-Hexane-Air Atmospheres in the Boundary Layer of a Moving Hot Sphere." *Combustion Science and Technology*, 188(11-12): 2267-2283, 2016.

[A12] **Stephanie A. Coronel**, Rémy Mével, Sally P. M. Bane, and Joseph E. Shepherd. "Experimental study of minimum ignition energy of lean H_2-N_2O mixtures." *Proceedings of the Combustion Institute*, 34(1): 895-902, 2012.

[A13] Sally P. M. Bane, Jack L. Ziegler, Phillip A. Boettcher, **Stephanie A. Coronel**, and Joseph E. Shepherd. "Experimental investigation of spark ignition energy in kerosene, hexane, and hydrogen." *Journal of Loss Prevention in the Process Industries*, 26(2): 290-294, 2011.

[A14] Sally P. M. Bane, Rémy Mével, **Stephanie A. Coronel**, and Joseph E. Shepherd. "Flame burning speeds and combustion characteristics of undiluted and nitrogen-diluted hydrogen-nitrous oxide mixtures." *International Journal of Hydrogen Safety*, 36(16): 10107-10116, 2011.

Refereed Conference Papers

[C1] Michael L. Hobbs, Michael J. Kaneshige. "Failure mechanism for thermally damaged detonators." Submitted for presentation at the 39th International Symposium on Combustion, Vancouver, Canada. July 24-29, 2022.

[C2] **Stephanie A. Coronel**, Rémy Mével, and Joseph E. Shepherd. "Analysis of synthetic flames." 27th International Colloquium on the Dynamics of Explosions and Reactive Systems, Beijing, China. July 24-29, 2019.

[C3] **Stephanie A. Coronel**, Simon Lapointe, Rémy Mével, Nabiha Chaumeix, and Joseph E. Shepherd. "Experimental n-hexane-air expanding spherical flames." 27th International Colloquium on the Dynamics of Explosions and Reactive Systems, Beijing, China. July 24-29, 2019.

[C4] **Stephanie A. Coronel**, Josué Melguizo-Gavilanes, Dmitry Davidenko, Rémy Mével, and Joseph E. Shepherd. "Reduction methodology for detailed kinetic mechanisms: application to n-hexane-air hot surface ignition." 11th Asia-Pacific Conference on Combustion, Sydney, Australia. December 10-14, 2017.

[C5] Rémy Mével, Josué Melguizo-Gavilanes, Lorenz R. Boeck, Augustin Nové-Josserand, Yuki Kishita, **Stephanie A. Coronel**, and Joseph E. Shepherd. "Ignition of hydrogen-air mixtures by a localized stationary hot surface." 11th International Symposium on Hazard Prevention, and Mitigation of Industrial Explosions, Dalian, China. July 24-29, 2016.

[C6] Josué Melguizo-Gavilanes, **Stephanie A. Coronel**, Rémy Mével, and Joseph E. Shepherd. "Ignition of hydrogen-air mixtures by a moving heated particle." 6th International Conference on Hydrogen Safety, Yokohoma, Japan. October 19-21, 2015.

[C7] Rémy Mével, Josué Melguizo-Gavilanes, **Stephanie A. Coronel**, and Joseph E. Shepherd. "Chemical kinetics of ignition of n-hexane by a moving hot sphere." 25th International Colloquium on the Dynamics of Explosions and Reactive Systems, Leeds, UK. August 2-7, 2015.

[C8] **Stephanie A. Coronel**, and Joseph E. Shepherd. "Effect of equivalence ratio on ignition and flame propagation of n-hexane-air mixtures using moving hot particles." 25th International Colloquium on the Dynamics of Explosions and Reactive Systems, Leeds, UK. August 2-7, 2015.

[C9] **Stephanie A. Coronel**, Shyam Menon, Rémy Mével, Guillaume Blanquart, and Joseph E. Shepherd. "Ignition of nitrogen diluted hexane-oxygen mixtures by moving heated particles." 24th International Colloquium on the Dynamics of Explosions and Reactive Systems, Taipei, Taiwan. July 28-August 2, 2013.

[C10] Sally P. M. Bane, **Stephanie A. Coronel**, Phillip A. Boettcher, and Joseph E. Shepherd. "Spark ignition of kerosene-air mixtures." 23th International Colloquium on the Dynamics of Explosions and Reactive Systems, Irvine, CA, USA. July 24-29, 2011.

[C11] Sally P. M. Bane, Jack L. Ziegler, Phillip A. Boettcher, **Stephanie A. Coronel**, and Joseph E. Shepherd. "Investigation of spark ignition in hydrogen, hexane, and kerosene: experiment and simulation." 8th International Symposium on Hazards, Prevention, and Mitigation of Industrial Explosions, Yokohoma, Japan. September 5-10, 2010.

Non-Refereed Conference Papers/ Presentations

[D1] **Stephanie A. Coronel**, Simon Lapointe, and Joseph E. Shepherd. "Boundary layer ignition modeling." 11th U.S. National Combustion Meeting, Pasadena, CA, USA. March 24-27, 2019.

[D2] **Stephanie A. Coronel**, and Joseph E. Shepherd. "Temporal evolution of fluid parcels in reactive thermal boundary layer." Third Annual California Alliance Retreat, Berkeley, CA, USA. April 8-9 , 2016.

[D3] **Stephanie A. Coronel**, Josué Melguizo-Gavilanes, and Joseph E. Shepherd. "Ignition of n-hexane-air by moving hot particles: effect of particle diameter." 9th U.S. National Combustion Meeting, Cincinnati, OH, USA. May 17-20, 2015.

[D4] **Stephanie A. Coronel**, Neal Bitter, Vaughan Thomas, Rémy Mével, and Joseph E. Shepherd. "Non-linear extrapolation of laminar flame properties from spherically expanding flames." 2014 Western States Section of the Combustion Institute Spring Meeting, Pasadena, CA, USA. March 24-25, 2014.

[D5] **Stephanie A. Coronel**, Rémy Mével, Pauline Vervish-Kljakic, Phillip A. Boettcher, Vaughan Thomas, Nabiha Chaumeix, Nasser Darabiha, and Joseph E. Shepherd. "Laminar burning speed of n-hexane-air mixtures." 8th U.S. National Combustion Meeting, Park City, UT, USA. May 19-22, 2013.

[D6] **Stephanie A. Coronel**, Sally P. M. Bane, Phillip A. Boettcher, and Joseph E. Shepherd. "Statistical analysis of spark ignition of kerosene air mixtures." 2011 Western States Section of the Combustion Institute Fall Meeting, Riverside, CA, USA. October 17-18, 2011.

[D7] Sally P. M. Bane, Rémy Mével, **Stephanie A. Coronel**, and Joseph E. Shepherd. "Flame speeds and combustion characteristics of undiluted and nitrogen-diluted hydrogen-nitrous oxide mixtures." 7th U.S. National Combustion Meeting, Atlanta, GA, USA. March 20-23, 2011.

Poster Presentations

[E1] **Stephanie A. Coronel**, Jean-Christophe Veilleux, and Joseph E. Shepherd. "Compression of reactive gas pocket in a water-filled pipe," Women in Aerospace Symposium, Stanford University. May 31-June 1, 2018.

[E2] **Stephanie A. Coronel**, and Joseph E. Shepherd. "Temporal evolution of fluid parcels in reactive thermal boundary layer," Future Fuels Workshop, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia. March 7-9, 2016.

[E3] **Stephanie A. Coronel**, and Joseph E. Shepherd. "Ignition of n-hexane-air by moving hot particles." Second Annual California Alliance Retreat, Pasadena, CA, USA. April 17-18, 2015.

[E4] **Stephanie A. Coronel**, Josué Melguizo-Gavilanes, and Joseph E. Shepherd. "Ignition of n-hexane-air mixtures by moving hot sphere." 35th International Symposium on Combustion, San Francisco, CA, USA. August 3-8, 2014.

[E5] **Stephanie A. Coronel**, Rémy Mével, Phillip A. Boettcher, Vaughan Thomas, and Joseph E. Shepherd. "Experimental measurement and modeling of hexane-air laminar burning speeds." 34th International Symposium on Combustion, Warsaw, Poland. July 29-August 3, 2012.

Invited Talks

[F1] "Thermal ignition dynamics of reactive environments," Invited Seminar, Department of Aeronautics & Astronautics, Stanford University, April 22, 2019.

[F2] "Thermal ignition dynamics of reactive environments," Invited Seminar, Department of Mechanical and Industrial Engineering, University of Illinois, Chicago, April 10, 2019.

[F3] "Ignition dynamics of reactive gaseous mixtures," Invited Seminar, Department of Astronautical Engineering, University of Southern California, April 5, 2019.

[F4] "Compression of reactive gas pocket in a water-filled pipe," Women in Aerospace Symposium, Stanford University, May 31-June 1, 2018.

[F5] "Thermal Ignition of Gaseous Mixtures: Experiments and Simplified Modeling," Invited Seminar, Department of Mechanical and Aerospace Engineering, University of California, San Diego, February 26, 2018.

[F6] "Thermal Ignition of Gaseous Mixtures: Experiments and Simplified Modeling," Fluids Seminar, Department of Mechanical Engineering, University of California, Berkeley, February 22, 2018.

[F7] "Compression Ignition of Reactive Gas Pocket in Water-Filled Pipe," Fluid Mechanics Research Conference, California Institute of Technology. February 6, 2018.

[F8] "Thermal Ignition of Gaseous Mixtures: Experiments and Simplified Modeling," AME Seminar, Department of Aerospace and Mechanical Engineering, University of Southern California, January 24, 2018.

[F9] "Quantitative imaging of ignition of gaseous mixtures," Invited Seminar, Department of Mechanical Engineering, University of Rochester, December 15, 2017.

[F10] "Thermal ignition by moving hot particles," Invited Seminar, Sandia National Laboratories, Albuquerque, September 19, 2017.

[F11] "Thermal ignition by moving hot particles," Invited Seminar, University of Tennessee Space Institute, Tullahoma, July 14, 2017.

[F12] "Thermal ignition by moving hot particles," Invited Seminar, Sandia National Laboratories, Livermore, February 20, 2017.

[F13] "Thermal ignition by moving hot particles," Invited Seminar, Air Force Research Laboratory, Edwards AFB, May 26, 2016.

[F14] "Thermal ignition by moving hot particles," Thermo/Fluids Research Seminar, Mechanical and Aerospace Engineering Department, University of California, Los Angeles. May 13, 2016.

[F15] "Ignition of n-hexane-air by moving hot particles: mechanism and effect of particle diameter," Fluid Mechanics Research Conference, California Institute of Technology. July 15, 2015.

[F16] "Ignition of n-hexane-air mixtures by moving hot spheres," Fluid Mechanics Research Conference, California Institute of Technology. January 28, 2014.

[F17] "Assessing the risk of accidental explosions in aircraft by heated particles," Women in Aerospace Symposium, Massachusetts Institute of Technology. April 18-19, 2013.

[F18] "Ignition of nitrogen diluted hexane-oxygen mixtures by moving heated particles," Fluid Mechanics Research Conference, California Institute of Technology. February 19, 2013.

[F19] "Statistical analysis of spark ignition of lean H_2-N_2O mixtures," Fluid Mechanics Research Conference, California Institute of Technology. January 10, 2012.

Teaching Experience

California Institute of Technology (as teaching assistant)
Ae104, Experimental Methods (Winter 2012)
Graduate level course on experiments in solid and fluid mechanics with emphasis on current research methods.
Ae121, Space Propulsion (Fall 2010, Winter 2011, Spring 2011)
Graduate level course that introduces the fundamentals of chemical, electric and advanced propulsion technologies.

University of Texas at Arlington (as teaching assistant)
MAE 1104, Introduction to Engineering (Spring 2008, Fall 2008, Spring 2009)
Undergraduate freshman-level course providing an overview of engineering and its many sub-fields, ethical responsibilities, creativity, and design.
MAE 1105, Introduction to Mechanical and Aerospace Engineering (Fall 2007)
Undergraduate freshman-level introductory laboratory course.

Mentoring Experience

Silken Jones (Caltech PhD student). Project: Moving Hot Particle Ignition. June-August 2016.
Augustin Nové-Josserand (École Polytechnique MS student). Project: Study of the ignition of hexane-air and hydrogen-air mixtures by concentrated hot surfaces. March-August 2015.
Sebastián Rojas-Mata (Caltech undergraduate). Project: Development of a near infrared two-color pyrometer for non-contact thermometry of moving heated particles. June-August 2012.

Professional and Service Activities

Conference Session Chair
11th U.S. National Combustion Meeting (2019)
International Symposium on Combustion (2016)
International Colloquium on the Dynamics of Explosions and Reactive Systems (2015)

Professional Affiliations
Member, The Combustion Institute
Member, Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)
Member, American Association for the Advancement of Science (AAAS)
Member, American Physical Society (APS)

Journal Reviews
Fuel
Experimental Thermal and Fluid Science
Combustion Science and Technology
Proceedings of the Combustion Institute

Conference Reviews
International Colloquium on the Dynamics of Explosions and Reactive Systems paper reviewer
Asia-Pacific Conference on Combustion paper reviewer
SACNAS presentation abstract and travel scholarship reviewer

University Service
Student Volunteer, Graduate Student Orientation at Caltech. September 2010.
Student Host, GradPreview Day at Caltech. 2009 – 2011.
Webmaster, American Society of Mechanical Engineers UTA student section. 2008 – 2009.
President, American Society of Mechanical Engineers UTA student section. 2007 – 2008.
Secretary, American Society of Mechanical Engineers UTA student section. 2006 – 2007.

Community Service
Volunteer Instructor at HMTech; taught "Mathematics in the Real World" to high school students during the summer of 2018.

Awards and Honors

Duncan Rannie Graduate Fellowship, California Institute of Technology, 2009 – 2010

Moore Foundation Minority Undergraduate Research Fellowship, Summer 2008
Outstanding ASME Student Member, University of Texas at Arlington, 2008
University of Texas at Arlington Academic Achievement Scholarship, 2007 – 2008
Student Alumni Sophomore Scholarship, University of Texas at Arlington, 2006 – 2007

Skills

Computer
Cantera, Python, Matlab, Mathematica, Maple, SolidWorks, LabVIEW, LaTeX, OpenFOAM, CTH (Sandia National Laboratories), COMSOL, CUBIT (Sandia National Laboratories)

Laboratory
High speed data acquisition, Schlieren visualization, optical and microwave interferometry, laser absorption spectroscopy, high-power laser operation, pyrometry, photon doppler velocimetry, mechanical design, plumbing design, electronic control system design

Miscellaneous
Bilingual in English and Spanish