Curriculum Vitae

Ya-Ting T. Liao, Ph.D.

CONTACT INFORMATION

Department of Mechanical and Aerospace Engineering
Case Western Reserve University
10900 Euclid Avenue, Glennan 479
Cleveland, Ohio 44106
Phone: 216-368-0048
e-mail: yating.liao@case.edu

EDUCATION

Case Western Reserve University, Cleveland, Ohio
Doctor of Philosophy, Mechanical and Aerospace Engineering, June 2011

- Thesis: "Three-dimensional model of solid ignition and ignition limit by a non-uniformly distributed radiant heat source"

Case Western Reserve University, Cleveland, Ohio
Master of Science, Mechanical and Aerospace Engineering, August 2007

- Thesis: "Ignition and flame growth in concurrent forced flow over thick solids"
- Award: Case Prime Fellowship, Case School of Engineering, Case Western Reserve University, 2005

National Taiwan University, Taipei, Taiwan
Bachelor of Science, Mechanical Engineering, June 2004
Bachelor of Science, Physics, June 2004

EXPERIENCE

Assistant Professor, Department of Mechanical and Aerospace Engineering
Case Western Reserve University, Cleveland, Ohio, May 2015 to present

- Research interests: solid pyrolysis, ignition, flame spread, material flammability, microgravity combustion, wildland fire, battery fire, enclosure fire, two-phase flow.

Thermo-Fluids Specialist, Multi-Physics Simulation Group
FMC Technologies, Houston, Texas, May 2014 to March 2015

- Evaluated flow conditions and thermal performance of various kinds of subsea equipment during pipeline start-up, production, and shut-down.
- Analyzed production fluid hydration formation time, Joule-Thomson effect in chocks, erosion rate inside pipelines, etc.
- Supported internal/external clients.
- Developed proprietary custom CFD software.

CFD Engineer
Yoya SciTech LLC, Cleveland, Ohio, January 2013 to December 2013

- Contracted for FMC Technologies.
- Built multi-phase flow analysis software from scratch, with a Fortran CFD backend and Java GUI front-end.
- Validated the program using classic benchmark cases and various published pipe flow experimental data.
- Documented physics models, numerical schemes, and code logic/structures.
- Prepared user manual and tutorials instructing users how to operate the program.

Software Developer, R&D Equity Fund Team
Bloomberg LP, New York, New York, July 2011 to June 2012

- Completed four-month intensive training in Unix, C, C++, JavaScript, Fortran, SQL, data structures, software engineering principles, comdb, comdb2, gtk, smrg/iceberg, UI design, and use of in-house development tools.
- Redesigned GUIs for several customer-facing Equity Fund terminal screens, to enhance functionality and clarity.
- Updated backend code to interface with comdb and comdb2 databases.
- Deployed code from development to alpha, beta, and production servers weekly.
- Maintained and enhanced financial database. Monitored intraday data flow.

Graduate Student Researcher, Computational Combustion Lab
Case Western Reserve University, Cleveland, Ohio, August 2005 to June 2011

- Used an unsteady three-dimensional model to simulate ignition and flame growth over solid fuel in reduced gravity.
- Investigated flame behavior in different pressures, oxygen percentages, gravity levels, forced flow conditions.
- Developed a Fortran program based on an in-house code to solve the problem numerically.
- Ran simulations mainly on university HPC Linux cluster.

PROFESSIONAL SOCIETIES

European Space Agency Topical Team, February 2016 to present
Combustion Institute, 2007 to present (***Member of Board of Advisors of the Central States Section***, May 2018 to present)
The International Association for Fire Safety Science, 2015 to present
American Society for Gravitational and Space Research, October 2016 to present
American Society of Mechanical Engineers, May 2017 to present

GRANTS AND AWARDS
Total grant received: $1.18M (my portion: $1.09M)

Grant received as a PI (total: $1.17M, my portion: $1.09M)

1. **Funding Agency:** NASA Glenn Research Center
   Proposal Title: Modeling Three-Dimensional Transient Flame Growth to Support the Saffire Microgravity Experiments (Award #NNX16AL61A)
   Co-I: James S. T'ien (CWRU)
   Award Amount: $500,000 ($461,746 to PI Liao)
   Project Period: June 2016 - June 2021
   Status: Active

2. **Funding Agency:** National Science Foundation (CBET: Combustion and Fire System)
   Proposal Title: Flame Spread in Confined Spaces – Study of the Interactions between Flame and Surrounding Walls (Award #1740478)
   Co-I: Paul Ferkul (USRA)
   Award Amount: $309,997 ($270,781 to PI Liao)
   Project Period: November 2017- October 2020
   Status: Active

3. **Funding Agency:** Underwriters Laboratories, Inc.
   Proposal Title: Standards Training in University Curriculum through a Configurable Course Module- Phase I: Preparation and Demonstration
   Award Amount: $50,000
   Project Period: December 2017- December 2018
   Status: Active

4. **Funding Agency:** Case Western Reserve University
   Proposal Title: Ignition propensity of structural materials exposed to firebrand in WUI fires
   Award Amount: $10,000
   Project Period: June 2018- May 2019
   Status: Active

5. **Funding Agency:** National Science Foundation (CBET: Combustion and Fire System)
   Proposal Title: Ignition propensity of structural materials exposed to firebrand in wildland-urban interface (WUI) fires
   Award Amount: $299,974
   Project Period: September 2018- August 2021
   Status: Active

Grant received as a Co-I (total: $10k)

6. **Funding Agency:** Case Western Reserve University
   Proposal Title: Workshops for IoT-based Smart Fire Fighting in Urban/Suburban Environments
   PI: Fumiaki Takahashi
   Co-PIs: Kiju Lee, James S. T'ien, Ya-Ting. Liao, Roger Quinn, Kathryn Daltorio

Award Amount: $10,000
Project Period: March 2018 - February 2019
Status: Active

PUBLICATIONS

Students under my direct supervision are underlined and marked blue (graduate) or green (under-graduate)

Articles in referred journals

1. D. L. Urban, P. Ferkul, S. Olson, G. A. Ruff, J. Easton, J. S. T'ien, **Y.-T. T. Liao**, C. Li, A. C. Fernandez-Pello, J. L. Torero, G. Legros, C. Eigenbrod, N. Smirnov, O. Fujita, S. Rouvreau, B. Toth, and G. Jomaas: Flame Spread: Effects of Microgravity and Scale, Combustion and Flame, 2018 (accepted)
2. C. Li, **Y.-T. T. Liao**: Numerical Investigation of Flame Splitting Phenomenon in Upward Flame Spread over Solids with a Two-Stage Pyrolysis Model, Combustion Science and Technology, 2018 (in print) doi:10.1080/00102202.2018.1489380
3. C. Li, **Y.-T. T. Liao**, J. S. T'ien, D. L. Urban, P. Ferkul, S. Olson, G. A. Ruff, and J. Easton: Transient Flame Growth and Spread Processes over a Large Solid Fabric in Concurrent Low-Speed Flows in Microgravity – Model versus Experiment, Proceedings of the Combustion Institute, 2018 (in print) doi:10.1016/j.proci.2018.05.168
4. Y. Li and **Y.-T. T. Liao**: Thermal Analysis and Pyrolysis Modeling of NOMEX IIIA Fabric, Combustion Science and Technology, Vol. 190, pp. 1580-1593, 2018 doi:10.1080/00102202.2018.1459587
5. J. Park, J. Brucker, R. Seballos, B. Kwon, and **Y.-T. T. Liao**: Concurrent Flame Spread over Discrete Thin Fuels, Combustion and Flame, Vol. 191, pp.116-125, 2018 doi:10.1016/j.combustflame.2018.01.008
6. X. Zhao, **Y.-T. T. Liao**, M. C. Johnston, J. S. T'ien, P. V. Ferkul, and S. L. Olson: Concurrent Flame Growth, Spread, and Quenching over Composite Fabric Samples in Low Speed Purely Forced Flow in Microgravity, Proceedings of the Combustion Institute, Vol. 36, pp. 2971-2978, 2017 doi:10.1016/j.proci.2016.06.028
7. **Y.-T. T. Liao** and J. S. T'ien: A Numerical Simulation of Transient Ignition and Ignition Limit of a Composite Solid by a Localised Radiant Source, Combustion Theory and Modelling, Vol. 17, Iss. 6, pp. 1096-1124, 2013 doi:10.1080/13647830.2013.831486
8. **Y.-T. Tseng** and J. S. T'ien: A Comparison of Flame Spread Characteristics over Solids in Concurrent Flow using Two Different Pyrolysis Models, Journal of Combustion, Vol. 2011, Article ID 250391, 2011 doi:10.1155/2011/250391
9. **Y.-T. Tseng** and J. S. T'ien: Limiting Length, Steady Spread and Non-growing Flames in Concurrent Flow over Solids, Journal of Heat Transfer, Vol. 132, Issue 9, 091201, 2010 doi:10.1115/1.4001645

Referred technical papers

1. S.-Y. Hsu, **Y.-T. Tseng** and J. S. T'ien: Modeling Flame Spread and Extinction of Solids in Space Exploration Atmospheres, SAE Technical Paper 2009-01-2492, 2009 doi:10.4271/2009-01-2492

Book project

1. X. Zhao, **Y.-T. T. Liao**, M. C. Johnston, J. S. T'ien, P. V. Ferkul, and S. L. Olson: Concurrent flame growth, spread, and extinction over composite fabric samples in low speed purely forced flow in microgravity, A Gallery of Combustion and Fire, Cambridge University Press, 2017 (accepted)
2. P. V. Ferkul, S. L. Olson, J. S. T'ien, M. C. Johnston, X. Zhao, **Y.-T. T. Liao**: Comparison of concurrent-flow and opposed-flow flame spreading in microgravity, A Gallery of Combustion and Fire, Cambridge University Press, 2017 (accepted)
3. P. Ferkul, S. Olson, D. Urban, G. Ruff, J. Easton, J. T'ien, **Y.-T. Liao**, A. C. Fernandez-Pello, J. Torero, C. Eigenbrod, G. Legros, N. Smirnov, O. Fujita, S. Rouvreau, B. Toth, G. Jomaas, Large Scale Flame Spread in Space, A Gallery of Combustion and Fire, Cambridge University Press, 2017 (accepted)

Conference papers (with an oral presentation)

1. Y. Li, **Y.-T. T. Liao**, and P. V. Ferkul: Effect of flow duct height on concurrent-flow flame spread and the near-limit oscillation, 2018 Spring Technical Meeting of Central States Section of the Combustion Institute, Minneapolis, MN, May 20–22, 2018
2. B. Kwon and **Y.-T. T. Liao**: Experimental and numerical investigation of the ignition and burning characteristics of a group of wooden pieces, 2018 Spring Technical Meeting of Central States Section of the Combustion Institute, Minneapolis, MN, May 20–22, 2018
3. P. Ferkul, S. Olson, D. L. Urban, G. A. Ruff, J. Easton, J. S. T'ien, **Y.-T. T. Liao**, A. C. Fernandez-Pello, J. L. Torero, C. Eigenbrod, G. Legros, N. Smirnov, O. Fujuta, S. Rouvreau, B. Toth and G. Jomaas: Results of Large-Scale Spacecraft Flammability Tests, 47th International Conference on Environmental Systems, Charleston, SC, July 16-20, 2017.
4. C. Li and **Y.-T. T. Liao:** Transient flame growth and spread processes over thin solids in concurrent low-speed flows in microgravity – a comparison between large and small sample sizes, 10th US National Combustion Meeting, College Park, MD, April 23-26, 2017.
5. Y. Li and **Y.-T. T. Liao**: Thermogravimetric analysis and modeling of NOMEX fabric pyrolysis, 10th US National Combustion Meeting, College Park, MD, April 23-26, 2017.
6. P. Ferkul, D. L. Urban, S. Olson, G. A. Ruff, J. S. T'ien, **Y.-T. T. Liao**, A. C. Fernandez-Pello, J. L. Torero, G. Legros, C. Eigenbrod, N. Smirnov, O. Fujita, S. Rouvreau, B. Toth, G. Jomaas: The Saffire Experiment: Large-Scale Combustion aboard Spacecraft, 10th US National Combustion Meeting, College Park, MD, April 23-26, 2017.
7. J. Park and **Y.-T. T. Liao**: Numerical Study of Upward Flame Spread over Discrete Fuels, Spring Technical Meeting of the Eastern States Section of the Combustion Institute, Princeton, NJ, March 13-16, 2016
8. C. Li and **Y.-T. T. Liao**: Numerical Simulation of Flame Splitting Phenomenon in Concurrent Flame Spread over Thin Solid Fuel with Two-Stage Pyrolysis, Spring Technical Meeting of the Eastern States Section of the Combustion Institute, Princeton, NJ, March 13-16, 2016

9. **Y.-T. Tseng** and J. S. T'ien: Ignition, Flame Flash and Flame Growth over solids in Concurrent Flows by a Three-Dimensional Transient Numerical Model, 7th U.S. National Combustion Meeting, Atlanta, GA, 2011
10. **Y.-T. Tseng** and J. S. T'ien: The Effect of Different Pyrolysis Descriptions on flame spread over Solids in Concurrent Flows, 6th U.S. National Combustion Meeting, Ann Arbor, MI, 2009
11. **Y.-T. Tseng** and J. S. T'ien: Limiting Length and Non-growing Flames in Concurrent Flow over Thick Solids, Eastern States Section Meeting of the Combustion Institute, Charlottesville, VA, 2007

Other Conference/Workshop Oral Presentations

1. C. Li, **Y.-T. T. Liao**, J. T'ien, D. Urban, G. A. Ruff, P. V. Ferkul, S. Olson, and J. Easton: Effect of Flow Velocity on Flame Spread Processes over a Large Solid Fabric in Concurrent Flow, 34th Annual Meeting of the American Society for Gravitational and Space Research, Bethesda, Maryland, October 31-November 3, 2018 (accepted)
2. A. J. Vetturini, W. Cui, **Y.-T. T. Liao**, S. Olson, and P. V. Ferkul: Effects of Area Density on Concurrent Flow Flame Spread Over a Thin Fuel in Normal and Microgravity, 34th Annual Meeting of the American Society for Gravitational and Space Research, Bethesda, Maryland, October 31-November 3, 2018 (accepted)
3. Q. Li, Y. Li, and **Y.T. T. Liao**: Numerical study of flame spread over solid combustible beneath an inert parallel-oriented plate, 10th FM Global Open Source CFD Fire Modeling Workshop, Norwood, Massachusetts, May 30-31, 2018
4. C. Li and **Y.-T. T. Liao**: Transient Flame Growth and Spread Processes over Thin Solids in Concurrent Low-Speed Flows in Microgravity – Effects of Sample and Flow Duct Sizes, 33rd Annual Meeting of the American Society for Gravitational and Space Research, Seattle, Washington, October 25-28, 2017
5. D. Urban, G. A. Ruff, P. V. Ferkul, S. Olson, J. Easton, J. T'ien, **Y.-T. T. Liao**, C. Fernandez-pello, J. L. Torero, G. Legros, C. Eigenbrod, N. Smirnov, O. Fujita, S. Rouvereau, B. Toth, and G. Jomaas: Saffire: A Novel Approach to Study of Spacecraft Fire Safety Using Un-manned Spacecraft, 33rd Annual Meeting of the American Society for Gravitational and Space Research, Seattle, Washington, October 25-28, 2017
6. J. Park and **Y.-T. T. Liao**: Numerical Study of Concurrent Flame Spread over an Array of Thin Discrete Solid Fuels, 32nd Annual Meeting of the American Society for Gravitational and Space Research, Cleveland, Ohio, October 26-29, 2016
7. C. Li, **Y.-T. T. Liao**, J. S. T'ien, D. L. Urban, and G. A. Ruff: Three-Dimensional Transient Numerical Simulation of the Large-Scale Spacecraft Fire Safety Test, Saffire I, 32nd Annual Meeting of the American Society for Gravitational and Space Research, Cleveland, Ohio, October 26-29, 2016
8. **Y.-T. T. Liao**, C. Li, X. Zhao, and J. S. T'ien: Development of Test-Based Solid Pyrolysis Model, 8th FM Global Open Source CFD Fire Modeling Workshop, Norwood, Massachusetts, May 19-20, 2016

Invited Talks

1. **Y.-T. T. Liao**: Ignition, Flame Growth, and Flame Spread over Solid Fuels in Concurrent Flows, The Symposium on Advanced Fire Science and Technology and Workshop, Cleveland, Ohio, July 19-29, 2017

2. J. Park and **Y.-T. T. Liao**: Numerical Study of Upward Flame Spread over Discrete Fuels, 8th Triennial International Aircraft Fire and Cabin Safety Research Conference, Atlantic City, New Jersey, October 24-27, 2016

Poster Presentations

1. C. Li, **Y.-T. T. Liao**, J. S. T'ien, D. L. Urban, P. Ferkul, S. Olson, G. A. Ruff, and J. Easton: Transient Flame Growth and Spread Processes over a Large Solid Fabric in Concurrent Low-Speed Flows in Microgravity, 11th Asia-Oceania Symposium on Fire Science and Technology, October 21-25, 2018 (accepted)
2. Y. Li, **Y.-T. T. Liao**, and P. Ferkul: Effect of Flow Duct Height on Concurrent-Flow Flame Spread and Near-Limit Oscillation, 11th Asia-Oceania Symposium on Fire Science and Technology, October 21-25, 2018 (accepted)
3. B. Kwon and **Y.-T. T. Liao**: Experimental and Numerical Investigation of the Ignition and Burning Characteristics of a Group of Wooden Pieces, 11th Asia-Oceania Symposium on Fire Science and Technology, October 21-25, 2018 (accepted)
4. W. Cui and **Y.-T. T. Liao**: Upward Flame Spread over Discrete Thin Fuels, 11th Asia-Oceania Symposium on Fire Science and Technology, October 21-25, 2018 (accepted)
5. Q. Li and **Y.-T. T. Liao**: Numerical Study of Flame Spread over Solid Combustible Beneath an Inert Parallel-Oriented Plate, 11th Asia-Oceania Symposium on Fire Science and Technology, October 21-25, 2018 (accepted)

ACADEMIC SERVICE

Grant Proposal Review
NASA Review Panel, 2016
NSF Review Panel, 2017

Journal and Conference Paper/Abstract Review
Fire Technology/Fire Safety Journal/Combustion Science and Technology/Combustion and Flame/Journal of Fire Sciences/Shock Waves
Proceedings of the Combustion Institute, 2018
Annual Meeting American Society for Gravitational and Space Research, 2017, 2018
International Conference on Environmental Systems, 2016, 2017, 2018
International Seminar on Fire and Explosion Hazards, 2019

Conference/Workshop Organization
Session/Workshop Organizer
IoT-Enabled Smart Firefighting Ideation Workshop, Cleveland OH, 2018
34th Annual Meeting of ASGSR, Combustion Sessions, Bethesda MD, 2018
33rd Annual Meeting of ASGSR, Combustion Sessions, Seattle WA, 2017
Session Chairs
34nd Annual Meeting of ASGSR, Solid Material Flammability Session, Bethesda MD, 2018
2018 Spring Technical Meeting of CSSCI, Fire Research Session, Minneapolis MN, 2018
10th U.S. National Combust. Meeting, Suppression/Protection Session, College Park MD, 2017
32nd Annual Meeting of ASGSR, Solid Material Flammability Session, Cleveland OH, 2016
36th International Symposium on Combustion, Fire Session, Seoul, South Korea, 2016

Campus Service
MAE Department Graduate Studies Committee, August 2015 to present
Case School of Engineering Research Committee, August 2015 to present
MAE Department Faculty Search Committee, September 2017 to present

TEACHING EXPERIENCE

Course	Semester	Number of Students	Instructor Overall Rating	Course Overall Rating
EMAE/EMAC463 Fire Dynamics	Spring 2016	7	2.67/5	2.67/5
	Fall 2016	9	5.00/5	4.80/5
	Fall 2018	7	-	-
EMAE371/471 Computational Fluid Dynamics	Spring 2017	16	4.00/5	4.00/5
	Spring 2018	15	3.60/5	3.40/5

STUDENT ADVISING

Graduate Students

Chengyao Li	PhD	July 2015 to present
Yanjun Li	PhD	March 2016 to present
Byoungchul Kwon	PhD	December 2016 to present
Wohan Cui	PhD	June 2017 to present
JeanHyuk Park	MS-A	June 2015 to December 2017
Qian Li	MS-A	September 2017 to present
Stephen Finnegan	BS/MS-B	December 2015 to May 2018
Shixun Gao	MS-B	August 2015 to May 2016
Minze Tao	MS-B	August 2016 to May 2017

Undergraduate Students

Drew Weibel	September 2015 to May 2016
Kexin Wang	January 2016 to August 2016
Shili Wu	November 2016 to August 2017
Jared Brucker	Spring 2017
Ryan Seballos	Spring 2017
Anthony J. Vetturini	Summer 2017, 2018
Sarah Paquet	Summer 2017
Zitong Zhang	Summer 2017
Ama Carney	Fall 2018

High School Students

Alessandra Vucenovic	Hathaway Brown	April 2017 to present

Margaret LeMay Hawken Summer 2017

PhD Dissertation Committee Member

Sangjin Lee, Macromolecular Science and Engineering, September 2016
"Structure-Property Relationships in Composite Layers Polymeric Film/Foam Systems"
Thesis Advisor: Joao Maia

Ming-Fang Kang, Mechanical and Aerospace Engineering, November 2016
"Investigation of Passive Cyclonic Gas-Liquid Separator Performance for Microgravity Applications"
Thesis Advisor: Yasuhiro Kamotani

Taneisha Deans, Macromolecular Science and Engineering, April 2017
"Using Nature as a way to Flame Retard Synthetic Materials"
Thesis Advisor: David A. Schiraldi

Michael Johnston, Mechanical and Aerospace Engineering, October 2017
"Growth and Extinction Limits: Ground Based Testing of Solid Fuel Combustion in Low Stretch Conditions in Support of Space Flight Experiments"
Thesis Advisor: James S. T'ien

Abdullah Al Amin, Mechanical and Aerospace Engineering, November 2017
"Multiscale Multiphysics Thermo-Mechanical Modeling of an MgB_2 Based Conduction Cooled MRI Magnet System"
Thesis Advisors: Ozan Akkus and Michael Martens

MS Thesis Committee Member

Wei Shang, Mechanical and Aerospace Engineering, January 2016
"Laboratory-Scale Evaluation of Meta-Aramid Material as a Fire Barrier for Flexible Polyurethane Foam"
Thesis Advisor: James S. T'ien

JeanHyuk Park, Mechanical and Aerospace Engineering, June 2017
"Numerical Study of Concurrent Flame Spread Over an Array of Thin Discrete Solid Fuels"
Thesis Advisor: Ya-Ting T. Liao

PhD Proposal Defense Committee Member

Jiyuan Kang, Mechanical and Aerospace Engineering, June 2016
Abdullah Al Amin, Mechanical and Aerospace Engineering, July 2016
Maryam Mortazavi, Civil Engineering, October 2017
Chengyao Li, Mechanical and Aerospace Engineering, February 2018
Zongyue Fan, Mechanical and Aerospace Engineering, February 2018
Yeyuan Li, Mechanical and Aerospace Engineering, March 2018
Gustavo Schinazi, Macromolecular Science and Engineering, March 2018
Byoungchul Kwon, Mechanical and Aerospace Engineering, August 2018
Yanjun Li, Mechanical and Aerospace Engineering, August 2018