

Iván Bermejo-Moreno

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Department of Aerospace and Mechanical Engineering
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EDUCATION HISTORY

California Institute of Technology Ph.D. in Aeronautics Academic advisor: Professor D. I. Pullin Dissertation title: <i>“On the non-local geometry of turbulence.”</i>	Pasadena, California, USA September 2004 - April 2008
California Institute of Technology M.Sc. in Aeronautics	Pasadena, California, USA September 2003 - June 2004
School of Aeronautics, Polytechnic University of Madrid Aeronautical Engineer (five-year program) End-of-studies special project: <i>“Experimental installation for the measurement of surface tension in liquids by the method of capillary waves”</i> (with highest honors).	Madrid, Spain September 1996 - July 2001

EMPLOYMENT HISTORY

University of Southern California, Associate Professor Assistant Professor Department of Aerospace and Mechanical Engineering	Los Angeles, California, USA March 2024 - present October 2015 - March 2024
Center for Turbulence Research, NASA/Stanford University Postdoctoral fellow Supervisors: Professor Parviz Moin, Professor Sanjiva K. Lele.	Stanford, California, USA July 2009 - June 2014
GMV Aerospace and Defense - Space Flight Dynamics Division Aeronautical Engineer Summer internship	Madrid, Spain 2001 - 2003 2000
Ignacio Da Riva Institute (IDR/UPM) Support and Operation Centres (USOCs) of the Manned Space Flight and Microgravity Division of the European Space Agency (ESA). Facility Support Centre for the Fluid Science Laboratory in the network of User Support and Operation Centres (USOCs) of the Manned Space Flight and Microgravity Division of the European Space Agency (ESA). Undergraduate research, academic year internship Supervisors: Professor J. Meseguer Ruiz, Professor J. M. Perales Perales.	Madrid, Spain 2000 - 2001

HONORS AND AWARDS

National Aeronautics and Space Administration Early Career Faculty Award.	2023
National Science Foundation CAREER Award.	2021/12/08
Postdoctoral Fellowship, Center for Turbulence Research, NASA/Stanford University.	2009-2014
Fulbright Fellowship.	2003-2008
The Hans G. Hornung Prize, GALCIT, Caltech. (awarded for the best oral Ph.D. defense presentation by a student advised by Aeronautics faculty)	2008
The William F. Ballhaus Prize, GALCIT, Caltech. (awarded for an outstanding doctoral dissertation in Aeronautics)	2008
The Rolf D. Buhler Memorial Award in Aeronautics, GALCIT, Caltech. (awarded for outstanding academic achievement in the Master's program in Aeronautics)	2004
End-of-studies National Awards, Special Mention, Official State Bulletin, Spain. (three awards nationwide in aeronautical engineering)	2001

PUBLICATIONS

Refereed journal articles:

[Xu, N.](#), & [Bermejo-Moreno, I.](#) (2024). "Wall-modeled large-eddy simulations of the flow over a Gaussian-shaped bump with a sensor-based blended wall model." *Phys. Rev. Fluids*, 9, 11. 114605. <https://doi.org/10.1103/PhysRevFluids.9.114605>

[Hoy, J.](#), & [Bermejo-Moreno, I.](#) (2022). "Fluid-structural coupling of an impinging shock-turbulent boundary layer interaction at Mach 3 over a flexible panel." *Flow*, 2, E35. <https://doi.org/10.1017/flo.2022.28>

[Bußmann, A.](#), [Buchmeier, J.](#), Dodd, M. S., Adami, S., & [Bermejo-Moreno, I.](#) (2022), "Tracking and analysis of interfaces and flow structures in multiphase flows," *Computers & Fluids*, 105665, <https://doi.org/10.1016/j.compfluid.2022.105665>

[Buchmeier, J.](#), [Bußmann, A.](#), [Gao, X.](#), & [Bermejo-Moreno, I.](#) (2021) "Geometry and dynamics of passive scalar structures in compressible turbulent mixing" *Phys. Fluids*, 33, 105126. <https://doi.org/10.1063/5.0068010>

Koh, D. Anderson, R. L. & [Bermejo-Moreno, I.](#) (2021) "Cell-mapping orbit search for mission design at ocean worlds using parallel computing" *The Journal of the Astronautical Sciences*, [dx.doi.org/10.1007/s40295-021-00251-6](https://doi.org/10.1007/s40295-021-00251-6)

[Gao, X., Bermejo-Moreno, I., & Larsson, J. \(2020\).](#) “Parametric numerical study of passive scalar mixing in shock turbulence interaction.” *J. Fluid Mech.*, 895, A21. doi:10.1017/jfm.2020.292

Choi, D., Park, E., Jung, E., Cha, B., Lee, S., Yu, J., Kim, P. M., Lee, S., Hong, Y. J., Koh, C., Cho, C., W. Wu, Y., Jeon, N. L., Wong, A., Shin, L., Kumar, R., **Bermejo-Moreno, I.**, Srinivasan, S., Cho, I.-T., and Hong Y.-K., (2019) “Piezo1 Incorporates Mechanical Force Signals to the Genetic Program that Governs Lymphatic Valve Development and Maintenance” *JCI Insight* 4(5):e125068. <https://doi.org/10.1172/jci.insight.125068>

Larsson, J., Kawai, S., Bodart, J. & **Bermejo-Moreno, I.** (2016) “Large eddy simulation with modeled wall-stress: recent progress and future directions.” *Mechanical Engineering Reviews*, JSME, volume 3, number 1, pages 15-00418. <https://doi.org/10.1299/mer.15-00418>

Larsson, J. , Laurence, S. J., **Bermejo-Moreno, I.**, Bodart, J., Karl, S. and Vicquelin, R., (2015) “Incipient thermal choking and stable shock-train formation in the heat-release region of a scramjet combustor. Part II: Large eddy simulations,” *Comb. Flame*, volume 162, pages 907-920. <https://doi.org/10.1016/j.combustflame.2014.09.017>

Bermejo-Moreno, I., L. Campo, J. Larsson, J. Bodart, D. Helmer & J. K. Eaton (2014) “Confinement effects in shock wave/turbulent boundary layer interactions through wall-modelled large-eddy simulations.” *J. Fluid Mech.*, volume 758, pages 5-62. <https://doi.org/10.1017/jfm.2014.505>

Larsson, J., **Bermejo-Moreno, I.** & Lele, S. K. (2013) “Reynolds- and Mach-number effects in canonical shock-turbulence interaction.” *J. Fluid Mech.*, volume 717, pages 293-321. <https://doi.org/10.1017/jfm.2012.573>

Atkinson, C., Chumakov, S., **Bermejo-Moreno, I.** & Soria, J. (2012) “Lagrangian evolution of the invariants of the velocity gradient tensor in a turbulent boundary layer” *Phys. Fluids*, volume 24, 105104. <https://doi.org/10.1063/1.4757656>

Yang, Y., Pullin, D. I. & **Bermejo-Moreno, I.** (2010) “Multi-scale geometric analysis of Lagrangian structures in isotropic turbulence.” *J. Fluid Mech.*, volume 654, pages 233-270. <https://doi.org/10.1017/S0022112010000571>

Bermejo-Moreno, I., Pullin, D. I. & Horiuti, K. (2009) “Geometry of enstrophy and dissipation, grid resolution effects and proximity issues in turbulence.” *J. Fluid Mech.*, volume 620, pages 121-166. <https://doi.org/10.1017/S002211200800476X>

Bermejo-Moreno, I. & Pullin, D. I. (2008) “On the non-local geometry of turbulence.” *J. Fluid Mech.*, volume 603, pages 101-135. <https://doi.org/10.1017/S002211200800092X>

Refereed conference proceedings:

Garmann, D. J., Schwartz, M., **Bermejo-Moreno, I.**, Larsson, Ganju, S., Brehm, C., J., Uzun, A., Muhka, T., Parsani, M., Flad, D. & Schrempp, J. (2024) “Summary of the Wall-Modeled LES Test Suite from the 2024 AIAA High-Fidelity CFD Verification Workshop” AIAA Aviation 2024 Forum.

[Buchmeier, J.](#), [Himanshu, FNU.](#), [Ramezani, D.](#), & **Bermejo-Moreno, I.**, “Parametric studies of subsonic and supersonic reentry phases of the Orion Crew Module through numerical simulations” AIAA SciTech 2023 Forum. <https://doi.org/10.2514/6.2023-1375>

[Ramezani, D.](#), Lee, M. W., & **Bermejo-Moreno, I.**, “Application of an Affine Nonlinear Galerkin Reduced-order Model to Compressible Fluid Flows” AIAA SciTech 2023 Forum. <https://doi.org/10.2514/6.2023-1377>

Larsson, J., **Bermejo-Moreno, I.**, Baurle, R. A., Garmann, D. J., Rizzetta, D. P., Brehm, C., Galbraith, M. C., & Gonzalez, D. R (2023) “Summary of the Smooth Body Separation Test Case at the 2022 High Fidelity CFD Verification Workshop” AIAA SciTech 2023 Forum. <https://doi.org/10.2514/6.2023-1241>

[Ramezani, D.](#), Lee, M. W., [Xu, N.](#) & **Bermejo-Moreno, I.** (2022) “Sensitivity to Snapshot Frequency in the POD-based Reduced-Order Modelling of Flow over a Gaussian Bump,” Proceedings of the 9th International Conference on Fluid Flow, Heat and Mass Transfer (FFHMT22) Niagara Falls, Canada June 08-10, 2022, Paper No. 145, <https://doi.org/10.11159/ffhmt22.145>

Hoy, J. & **Bermejo-Moreno, I** (2021) “Numerical study of STBLI on flexible panels with wall-modeled LES,” AIAA SciTech 2021 Forum. <https://doi.org/10.2514/6.2021-0250>

Bermejo-Moreno, I., Bodart, J., Larsson, J., Barney, B., Nichols, J. & Jones, S. (2013) “Solving the compressible Navier-Stokes equations on up to 1.97 million cores and 4.1 trillion grid points” *Proceedings of SC13: International Conference for High Performance Computing, Networking, Storage and Analysis, SC'13*, pages 62:1–62:10. New York, NY, USA: ACM. <https://doi.org/10.1145/2503210.2503265> (20% acceptance rate)

Manuscripts submitted to peer-reviewed journals:

[Xu, N.](#) and **Bermejo-Moreno, I.** ”Wall-modeled large-eddy simulations of flow over a Gaussian-shaped bump with a novel sensor-based blended approach” (submitted to Phys. Rev. Fluids on Oct 13, 2023)

CONFERENCE PRESENTATIONS, WORKSHOPS AND SEMINARS

(current/former [Ph.D. students](#), [postdoctoral scholars](#), and [M.Sc. students](#) in my research group are marked with underlined colored text)

Larsson, J., **Bermejo-Moreno, I.**, & Garmann, D. “Summary of the Wall-Modeled LES Test Suite from the 2024 AIAA High-Fidelity CFD Workshop” AIAA Aviation Forum, Las Vegas, July 2024. <https://doi.org/>

Larsson, J., **Bermejo-Moreno, I.**, & Brehm, C. “Wall-modeled large eddy simulation of smooth-body separation: results of a CFD verification workshop,” WCCM2024, Vancouver, Canada, July 2024 https://storage.googleapis.com/usacm_static_shared/wccm2024/WCCM%20Program%20-%20Website.pdf

Bermejo-Moreno, I., Larsson, J. & Uzun, A. “Verification and scaling performance of the Light Exascale Application (LEA) for exascale simulations of turbulent flows” Fluids Engineering Division Summer Meeting (FEDSM 2024), American Society of Mechanical Engineers (ASME), Anaheim, CA, July 2024, <https://event.asme.org/Events/media/library/resources/fedsm/FEDSM-2024-Conference-Program.pdf>

[Rubien, V.](#), & **Bermejo-Moreno, I.** “Wall-modeled large-eddy simulations of wall heating and cooling effects in shock-turbulent boundary layer interactions,” Thirteenth International Symposium on Turbulence and Shear Flow Phenomena (TSFP13) June 25-28, 2024, Montréal, Canada <https://www.conftool.com/tsfp13/sessions.php>

[Dalman, B.](#), & **Bermejo-Moreno, I.** “Verification and scaling performance of the Light Exascale Application (LEA) for exascale simulations of turbulent flows” 17th Southern California Flow Physics Symposium (SoCal Fluids XVII), University of California, Irvine, April 2024. <https://sites.uci.edu/socalfluidsxvii/program/>

[Rubien, V.](#), & **Bermejo-Moreno, I.** “Wall-modeled large-eddy simulation of shock/turbulent-boundary layer interactions over adiabatic, heated, and cooled walls” 17th Southern California Flow Physics Symposium (SoCal Fluids XVII), University of California, Irvine, April 2024. <https://sites.uci.edu/socalfluidsxvii/program/>

[Xu, N.](#), & **Bermejo-Moreno, I.** “Sensor-based blended wall modeled LES of flows with relaminarization” 17th Southern California Flow Physics Symposium (SoCal Fluids XVII), University of California, Irvine, April 2024. <https://sites.uci.edu/socalfluidsxvii/program/>

[Dalman, B.](#), & **Bermejo-Moreno, I.** “Light Exascale Application (LEA): an exascale code for the simulation of compressible turbulent flows,” 76th Annual Meeting of the APS Division of Fluid Dynamics, Washington, D.C, November 2023. <https://meetings.aps.org/Meeting/DFD23/Session/T15.2>

[Xu, N.](#), & **Bermejo-Moreno, I.** “Wall-modeled large-eddy simulations of flow over a Gaussian-shaped bump with a novel sensor-based blended approach,” 76th Annual Meeting of the APS Division of Fluid Dynamics, Washington, D.C, November 2023. <https://meetings.aps.org/Meeting/DFD23/Session/L05.4>

[Rubien, V.](#), & **Bermejo-Moreno, I.** “Wall thermal effects in wall-modeled and wall-resolved large-eddy simulation of compressible flows,” 76th Annual Meeting of the APS Division of Fluid Dynamics, Washington, D.C, November 2023. <https://meetings.aps.org/Meeting/DFD23/Session/J13.8>

[Xu, N.](#), & **Bermejo-Moreno, I.** “Wall-modeled large-eddy simulations of the flow over a Gaussian-shaped bump with a relaminarization sensor” 16th Southern California Flow Physics Symposium (SoCal Fluids XIII), San Diego State University, California, April 2023. <https://sites.google.com/sdsu.edu/socalfluidsxvi/>

[Rubien, V.](#), & **Bermejo-Moreno, I.** “Wall-resolved and wall-modeled large-eddy simulations of shock waves interacting with turbulent boundary layer over adiabatic, heated, and cooled walls” 16th Southern California Flow Physics Symposium (SoCal Fluids XIII), San Diego State University, California, April 2023. <https://sites.google.com/sdsu.edu/socalfluidsxvi/>

[Dalman, B.](#), & **Bermejo-Moreno, I.** “Development of the Light Exascale Application (LEA) for exascale simulations of turbulent flows” 16th Southern California Flow Physics Symposium (SoCal Fluids XIII), San Diego State University, California, April 2023. <https://sites.google.com/sdsu.edu/socalfluidsxvi/>

[Buchmeier, J.](#), [Himanshu, FNU.](#), [Ramezani, D.](#), & **Bermejo-Moreno, I.**, “Parametric studies of subsonic and supersonic reentry phases of the Orion Crew Module through numerical simulations” AIAA SciTech Forum, National Harbor, Maryland, January 2023. <https://doi.org/10.2514/6.2023-1375.vid>

[Ramezani, D.](#), Lee, M. W., & **Bermejo-Moreno, I.**, “Application of an Affine Nonlinear Galerkin Reduced-order Model to Compressible Fluid Flows” AIAA SciTech Forum, National Harbor, Maryland, January 2023. <https://doi.org/10.2514/6.2023-1377.vid>

Larsson, J., **Bermejo-Moreno, I.**, Baurle, R. A., Garmann, D. J., Rizzetta, D. P., Brehm, C., Galbraith, M. C., & Gonzalez, D. R (2023) “Summary of the Smooth Body Separation Test Case at the 2022 High Fidelity CFD Verification Workshop” AIAA SciTech Forum, National Harbor, Maryland, January 2023. <https://doi.org/10.2514/6.2023-1241.vid>

[Xu, N.](#), & **Bermejo-Moreno, I.** “Wall-modeled large-eddy simulations of the flow over a Gaussian-shaped bump with a relaminarization sensor,” 75th Annual Meeting of the APS Division of Fluid Dynamics, Indianapolis, Indiana, November 2022. <https://meetings.aps.org/Meeting/DFD22/Session/Q08.8>

[Hoy, J.](#), and **Bermejo-Moreno, I.**, “Numerical simulation of the interaction of oscillating oblique shock waves and turbulent boundary layers over flexible and rigid surfaces,” 75th Annual Meeting of the APS Division of Fluid Dynamics, Indianapolis, Indiana, November 2022. <https://meetings.aps.org/Meeting/DFD22/Session/T10.6>

[Ramezani, D.](#), Lee, M. W., [Xu, N.](#) & **Bermejo-Moreno, I.** “Sensitivity to Snapshot Frequency in the POD-based Reduced-Order Modelling of Flow over a Gaussian Bump,” 9th International Conference on Fluid Flow, Heat and Mass Transfer (FFHMT22) Niagara Falls, Canada June 08-10, 2022, Paper No. 145. <https://doi.org/10.11159/ffhmt22.145>

[Hoy, J.](#) & **Bermejo-Moreno, I.** “Numerical simulations of an impinging shock-turbulent boundary layer interaction at Mach 3 over a flexible panel” 15th Southern California Flow Physics Symposium (SoCal Fluids XIII), University of California, Los Angeles, California, April 2022.

[Xu, N.](#) & **Bermejo-Moreno, I.** “Wall-modeled large-eddy simulations of the flow over a Gaussian-shaped bump with a laminar-to-turbulent transition sensor” 15th Southern California Flow Physics Symposium (SoCal Fluids XIII), University of California, Los Angeles, California, April 2022.

[Buchmeier, J.](#) & **Bermejo-Moreno, I.** “Evolution of vortical structures in compressible mixing layers” 15th Southern California Flow Physics Symposium (SoCal Fluids XIII), University of California, Los Angeles, California, April 2022.

[Buchmeier, J.](#), and **Bermejo-Moreno, I.**, “Dynamics of vortical structures in compressible mixing layers through tracking and graph-based geometrical analyses,” 74th Annual Meeting of the APS Division of Fluid Dynamics, Phoenix, Arizona, November 2021. <https://meetings.aps.org/Meeting/DFD21/Session/Q21.3>

[Hoy, J.](#), and **Bermejo-Moreno, I.**, “Numerical study of the effect of fluid-structural coupling on shock turbulent boundary layer interaction,” 74th Annual Meeting of the APS Division of Fluid Dynamics, Phoenix, Arizona, November 2021. <https://meetings.aps.org/Meeting/DFD21/Session/Q21.3>

[Xu, N.](#), & **Bermejo-Moreno, I.** “Wall-modeled large-eddy simulations of flow over a Gaussian-shaped bump with a relaminarization sensor,” 74th Annual Meeting of the APS Division of Fluid Dynamics, Phoenix, Arizona, November 2021. <https://meetings.aps.org/Meeting/DFD21/Session/Q07.7>

[Hoy, J.](#) & **Bermejo-Moreno, I.** “Numerical study of STBLI on flexible panels with wall-modeled LES,” AIAA SciTech Forum, January 2021 (virtual). <https://doi.org/10.2514/6.2021-0250.vid>

Larsson, J., Baurle, R., Brehm, C., Garmann, D., **Bermejo-Moreno, I.**, Galbraith, M., Gonzalez, D., Komives, J., Rizzeta, D., Subbareddy, P., Toosi, S. “Description and preliminary results of the LES smooth-body separation test case for the 2022 High-Fidelity CFD workshop,” AIAA SciTech Forum, January 2021 (virtual).

[Hoy, J.](#) & **Bermejo-Moreno, I.** “Numerical investigation of shock-turbulent boundary layer interaction on flexible panels using wall modelled large eddy simulations” 73rd Annual Meeting of the APS Division of Fluid Dynamics, Chicago, Illinois, November 2020 (virtual).

[Buchmeier, J.](#), [Bussmann, A.](#), [Gao, X.](#) & **Bermejo-Moreno, I.** “Temporal evolution of flow features in isotropic turbulence and shock-turbulence interaction” 73rd Annual Meeting of the APS Division of Fluid Dynamics, Chicago, Illinois, November 2020 (virtual).

[Gao, X.](#), **Bermejo-Moreno, I.** & Larsson, J. “Shock-induced Ignition in 2D Shock Turbulence Interaction” 73rd Annual Meeting of the APS Division of Fluid Dynamics, Chicago, Illinois, November 2020 (virtual).

[Xu, N.](#) & **Bermejo-Moreno, I.** “Wall-modeled large-eddy simulations of turbulent flow over a Gaussian-shaped bump” 14th Southern California Flow Physics Symposium (SoCal Fluids XIV), California Institute of Technology, Pasadena, California, April 2021 (virtual).

[Hoy, J.](#) & **Bermejo-Moreno, I.** “On the use of surrogate models to guide high-fidelity flow-structure interaction simulations of shock/turbulent-boundary-layer interactions on flexible panels” 14th Southern California Flow Physics Symposium (SoCal Fluids XIV), California Institute of Technology, Pasadena, California, April 2021 (virtual).

[Buchmeier, J.](#) & **Bermejo-Moreno, I.** “Evolution of passive scalar structures in compressible turbulent mixing” 14th Southern California Flow Physics Symposium (SoCal Fluids XIV), California Institute of Technology, Pasadena, California, April 2021 (virtual).

[Buchmeier, J.](#), [Bussmann, A.](#), [Gao, X.](#) & **Bermejo-Moreno, I.** “Tracking of flow structures in shock-turbulence interaction” 72nd Annual Meeting of the APS Division of Fluid Dynamics, Seattle, Washington, November 2019.

Toosi, S., Larsson, J. & **Bermejo-Moreno, I.** “Algorithmic grid selection in LES” 72nd Annual Meeting of the APS Division of Fluid Dynamics, Seattle, Washington, November 2019.

[Hoy, J.](#) & **Bermejo-Moreno, I.** “Analysis of the effect of elasticity on Shock Turbulent Boundary Layer Interaction” 72nd Annual Meeting of the APS Division of Fluid Dynamics, Seattle, Washington, November 2019.

[Bussmann, A.](#), [Buchmeier, J.](#), Dodd, M. & **Bermejo-Moreno, I.** “Tracking droplet breakup in homogenous isotropic turbulence” 72nd Annual Meeting of the APS Division of Fluid Dynamics, Seattle, Washington, November 2019.

[Gao, X.](#), **Bermejo-Moreno, I.**, & Larsson, J. “Alignment Analysis of Passive Scalar Mixing in Shock Turbulence Interaction” 72nd Annual Meeting of the APS Division of Fluid Dynamics, Seattle, Washington, November 2019.

Di Battista, R., **Bermejo-Moreno, I.**, Ménard T., de Chaisemartin, S. & Massot, M. “Post-processing of two-phase DNS simulations exploiting geometrical features and topological invariants to extract flow statistics: application to canonical objects and the collision of two droplets” 10th International Conference on Multiphase FlowAt, Rio de Janeiro, Brazil, May 2019.

[Buchmeier, J.](#) & **Bermejo-Moreno, I.** “Geometry of passive scalar mixing structures in shock-turbulence interaction” 13th Southern California Flow Physics Symposium (SoCal Fluids XIII), Santa Barbara, California, April 2019.

[Hoy, J.](#) & **Bermejo-Moreno, I.** “Numerical simulation of shock-boundary layer interactions on flexible panels” 13th Southern California Flow Physics Symposium (SoCal Fluids XIII), Santa Barbara, California, April 2019.

[Gao, X.](#), **Bermejo-Moreno, I.**, & Larsson, J. “Direct Numerical Simulation of Passive Scalar Mixing in Shock Turbulence Interaction: Effects of Taylor Microscale Reynolds Number” 13th Southern California Flow Physics Symposium (SoCal Fluids XIII), Santa Barbara, California, April 2019.

[Gao, X.](#), **Bermejo-Moreno, I.**, Larsson, J., Fu, L. & Lele, S. K. “Flow Topology and Alignment Analysis of Passive Scalar Mixing in Shock Turbulence Interaction” 71th Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, Georgia, November 2018.

[Buchmeier, J.](#), [Gao, X.](#) **Bermejo-Moreno, I.**, Larsson, J., Fu, L. & Lele, S. K. “Time-evolution of passive scalar structures in shock-turbulence interaction” 71th Annual Meeting of the APS Division of Fluid Dynamics, Atlanta, Georgia, November 2018.

Koh, D., Anderson, R. L. & **Bermejo-Moreno, I.** “Exploration of three-dimensional orbit bifurcations in the CRTBP using cell mapping,” AAS/AIAA Astrodynamics Specialist Conference, AAS 18-264, Snowbird, UT, August 19-23, 2018

[Buchmeier, J.](#), [Gao, X.](#) & **Bermejo-Moreno, I.** “A Methodology to Track Structures in Turbulent Flow” 12th Southern California Flow Physics Symposium (SoCal Fluids XII), Los Angeles, California, April 2018.

[Gao, X.](#), **Bermejo-Moreno, I.** & Larsson, J. “Direct Numerical Simulation of Passive Scalar Mixing in Shock Turbulence Interaction” 12th Southern California Flow Physics Symposium (SoCal Fluids XII), Los Angeles, California, April 2018.

[Gao, X.](#), **Bermejo-Moreno, I.** & Larsson, J. “Direct Numerical Simulation of Passive Scalar Mixing in Shock Turbulence Interaction” 70th Annual Meeting of the APS Division of Fluid Dynamics, Denver, Colorado, November 2017.

Koh, D., Anderson, R. L. & **Bermejo-Moreno, I.** Cell Mapping Orbit Search for Mission Design at Ocean Worlds Using Parallel Computing, AAS/AIAA Astrodynamics Specialist Conference, AAS 17-756, Stevenson, Washington, August 20-24, 2017.

De, S., Brewick, P. T., Johnson, E. A., Wojtkiewicz, S. F., **Bermejo-Moreno, I.** “Error and Likelihood Bounds for Falsification of Dynamical Models” IMAC-XXXV Conference, Society for Experimental Mechanics, Garden Grove, California, January-February 2017.

Bermejo-Moreno, I., Campo, L., Larsson, J., Bodart, J., Helmer, D. & Eaton, J. “Confinement effects in shock/turbulent-boundary-layer interaction through wall-modeled LES” 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, Oregon, November 2016.

Adami, S., Kaiser, J., **Bermejo-Moreno, I.** & Adams, N. “Simulating shock-bubble interactions at water-gelatin interfaces” 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, Oregon, November 2016.

Schreyer, A.-M., **Bermejo-Moreno, I.**, Kim, J. & Urzay, J. “Separation control in a hypersonic shock wave / turbulent boundary-layer interaction” 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, Oregon, November 2016.

Philip, J., **Bermejo-Moreno, I.**, Chung, D. and Marusic, I. “Characteristics of the entrainment velocity in a developing wake” International Symposium on Turbulence and Shear Flow Phenomena, TSFP-9, Melbourne, Australia, July 2015.

Vane, Z., **Bermejo-Moreno, I.** & Lele, S. K. “Wall-Modeled Large-Eddy Simulations of a Supersonic Turbulent Flow in a Square Duct” AIAA Fluid Dynamics Conference, Atlanta, Georgia, June 2014.

Bermejo-Moreno, I., Campo, L., Larsson, J., Bodart, J., Helmer, D. B. & Eaton, J. K. “Confinement effects in shock/turbulent-boundary-layer interaction through wall-modeled large-eddy simulations” Thermal and Fluid Sciences Affiliates and Sponsors Conference, Stanford, California, February 2014.

Vane, Z., **Bermejo-Moreno, I.**, & Lele, S. K. “Wall-modeled LES of a three-dimensional shock train in a constant area duct” Thermal and Fluid Sciences Affiliates and Sponsors Conference, Stanford, California, February 2014.

Bermejo-Moreno, I., Bodart, J., Larsson, J., & Iaccarino, G. “Compressible flow solvers and uncertainty analysis on million-core architectures.” Thermal and Fluid Sciences Affiliates and Sponsors Conference, Stanford, California, February 2014.

Larsson, J., Vicquelin, R., Bodart, J., **Bermejo-Moreno, I.** & Laurence, S. “Quasi-dual-mode behavior in the combustor of the HyShot scramjet” 66th Annual Meeting of the APS Division of Fluid Dynamics, Pittsburgh, Pennsylvania, November 2013.

Vane, Z., **Bermejo-Moreno, I.** & Lele, S. K. “Simulations of a normal shock train in a constant area duct using wall-modeled LES” 66th Annual Meeting of the APS Division of Fluid Dynamics, Pittsburgh, Pennsylvania, November 2013.

Bermejo-Moreno, I., Campo, L., Larsson, J., Emory, M., Bodart, J., Palacios, F., Iaccarino, G. & Eaton, J. K. “Multi-fidelity numerical simulations of shock/turbulent-boundary layer interaction with uncertainty quantification” 66th Annual Meeting of the APS Division of Fluid Dynamics, Pittsburgh, Pennsylvania, November 2013.

Bermejo-Moreno, I., Bodart, J., Larsson, J., Barney, B., Nichols, J. & Jones, S. “Solving the compressible Navier-Stokes equations on up to 1.97 million cores and 4.1 trillion grid points” SC’13, 2013 International Conference for High Performance Computing, Networking, Storage and Analysis, November 17-21 2013, Denver, CO, USA.

Bermejo-Moreno, I., Campo, L., Larsson, J., Bodart, J., Helmer, D. & Eaton, J. K. “Wall-modeled Large-Eddy Simulations of shock/turbulent-boundary-layer interactions in a low aspect-ratio duct” International International Symposium on Turbulence and Shear Flow Phenomena, TSFP-8, Poitiers, France, August 2013.

Bermejo-Moreno, I., Moin, P. & Iaccarino, G. “Predictive Simulations of Multi-Physics Flow Phenomena with Application to Integrated Hypersonic Systems” 12th U.S. National Congress on Computational Mechanics (USNCCM12), Raleigh, North Carolina, July 2013.

Bermejo-Moreno, I. & Moin, P. “Center for Predictive Simulations of Multi-Physics Flow Phenomena with Application to Integrated Hypersonic Systems” Stewardship Science Academic Program (SSAP) Annual Review Symposium, Albuquerque, New Mexico, June 2013.

Vane, Z., **Bermejo-Moreno, I.** & Lele, S. K. “Simulations of a normal shock train in a constant area duct using wall-modeled LES” AIAA Fluid Dynamics Conference, San Diego, California, June 2013.

Bermejo-Moreno, I., Campo, L., Larsson, J., Iaccarino, G. & Eaton, J. K. “Multi-fidelity numerical simulations of shock/turbulent-boundary-layer interaction in a duct with uncertainty quantification” Thermal and Fluid Sciences Affiliates and Sponsors Conference, Stanford, California, February 2013.

Vane, Z., **Bermejo-Moreno, I.** & Lele, S. K. “Simulations of a normal shock-train in a constant-area duct using wall-modeled LES” Thermal and Fluid Sciences Affiliates and Sponsors Conference, Stanford, California, February 2013.

Bermejo-Moreno, I. “Towards air-breathing hypersonic vehicles” HPC Advisory Council Stanford Conference 2013, Stanford, California, February 2013.

Bermejo-Moreno, I. “Continuous Integration in software development through open-source tools” HPC Advisory Council Stanford Conference 2013, Stanford, California, February 2013.

Bermejo-Moreno, I., Bodart, J., Nichols, J. W. & Palacios, F. “Scaling CFD and UQ codes on Sequoia (BG/Q)” HPC Advisory Council Stanford Conference 2013, Stanford, California, February 2013.

Bermejo-Moreno, I., Larsson, J., Campo, L., Bodart, J., Helmer, D. Ham, F. & Eaton, J. K. “Wall-modeled large-eddy simulations of shock/turbulent-boundary layer interaction in a duct” 65th Annual Meeting of the APS Division of Fluid Dynamics, San Diego, California, November 2012.

Urzay, J & **Bermejo-Moreno, I.** “Kinetic models and geometrical sensitivities: combined experimental and computational investigations” Verification and Validation Meeting, Ann Arbor, Michigan, August 2012.

Bermejo-Moreno, I., Droesbeke, H., Larsson, J. & Iaccarino, G. “Shock-Boundary Layer Interaction In A Low-Aspect-Ratio Duct” Thermal and Fluid Sciences Affiliates and Sponsors Conference, Stanford, California, February 2012.

Hickel, S., Egerer, C.P., Larsson, J, & **Bermejo-Moreno, I.** “Implicit Large-Eddy Simulation of Shock-Turbulence Interaction.” 11th U.S. National Congress on Computational Mechanics; St. Paul, Minnesota, July 2011.

Atkinson, C., Chumakov, S., **Bermejo-Moreno, I.**, & Soria, J. “Mean Topological Evolution in a Turbulent Boundary Layer” Seventh International Symposium on Turbulence and Shear Flow Phenomena (TSFP-7), Ottawa, Canada, July 2011.

Bermejo-Moreno, I., Larsson, J. & Lele, S. “LES of shock turbulence interaction” Thermal and Fluid Sciences Affiliates and Sponsors Conference, Stanford, California, February 2011.

Chumakov, S., Atkinson, C., **Bermejo-Moreno, I.**, Wu, X. & Soria, J. “Geometrical structure and topology of pressure Hessian in the turbulent boundary layer” 63rd Annual Meeting of the APS Division of Fluid Dynamics, Long Beach, California, November 2010.

Atkinson, C., Chumakov, S., **Bermejo-Moreno, I.**, Wu, X. & Soria, J. “Time-evolution and time-scales of topological structures in a turbulent boundary layer through conditional mean trajectory analysis” 63rd Annual Meeting of the APS Division of Fluid Dynamics, Long Beach, California, November 2010.

Bermejo-Moreno, I., Atkinson, C., Chumakov, S., Wu, X. & Soria, J. “Multi-scale geometry of flow structures in a flat-plate turbulent boundary layer” 63rd Annual Meeting of the APS Division of Fluid Dynamics, Long Beach, California, November 2010.

Bermejo-Moreno, I., Larsson, J. & Lele, S. “Large-eddy simulations of the shock-turbulence interaction canonical problem” 63rd Annual Meeting of the APS Division of Fluid Dynamics, Long Beach, California, November 2010.

Pai, M. G., **Bermejo-Moreno, I.**, Desjardins, O. & Pitsch, H. “Role of Weber number in the primary breakup of liquid jets in cross ow” 62nd Annual Meeting of the APS Division of Fluid Dynamics, Minneapolis, Minnesota, November 2009.

Yang, Y., Pullin, D. I. & **Bermejo-Moreno, I.** “Multi-scale geometric analysis of Lagrangian structures in isotropic turbulence” 62nd Annual Meeting of the APS Division of Fluid Dynamics, Minneapolis, Minnesota, November 2009.

Bermejo-Moreno, I., Pullin, D. I. & Horiuti, K. “On the non-local geometry of turbulence” 60th Annual Meeting of the APS Division of Fluid Dynamics, Salt Lake City, Utah, November 2007.

Bermejo-Moreno, I. & Pullin, D. I. “Geometrical and multi-scale analysis of scalar structures in forced homogeneous turbulence” 59th Annual Meeting of the APS Division of Fluid Dynamics, Tampa, Florida, November 2006.

INVITED PRESENTATIONS

“Interactions of shock waves and turbulence through numerical simulations” MAE Seminar, University of California, Irvine, February 2024.

“A perspective on joint numerical and experimental studies on interactions of shock-waves and turbulent boundary layers,” 2nd Colloquium on Separation Control in High-Speed Flows - mechanisms, methods, and application, 25-27 September 2023, Aachen, Germany (Keynote lecture)

“Interactions of shock waves and turbulence through numerical simulations,” GALCIT Colloquium, California Institute of Technology, Graduate Aerospace Laboratories, May 2023.

“Interactions of shock waves and turbulence through numerical simulations,” University of Southern California, Department of Aerospace and Mechanical Engineering, April 2023.

“Numerical simulations of oblique shocks impinging on turbulent boundary layers developed over flexible walls,” San Diego State University, Department of Aerospace Engineering, September 2022.

“Simulation and analysis of turbulent flows with shock waves over rigid and elastic walls.” Computational Science Division (CPS) Seminar, Argonne Leadership Computing Facility (ALCF), Argonne National Laboratory (virtual), April 2022.

“Flow-structure interactions of STBLIs on flexible panels with WMLES.” NATO AVT-352 Task Force: Measurement, Modelling and Prediction of Hypersonic Turbulence (virtual), April 2021.

“Numerical study of shock waves interacting with turbulent boundary layers developed over flexible panels.” (virtual) Sandia National Laboratory, March 2021.

“Interactions of shock waves, turbulent boundary layers, and flexible panels.” (virtual) Mechanics Seminar, The UW-Madison Mechanics Group, University of Wisconsin, Madison, March 2021.

“Shock-induced turbulent mixing and interactions with flexible panels through simulations.” (virtual) Penn Institute for Computational Science, October 2020.

“Numerical Investigation of Shock-Induced Phenomena in Turbulent Flows.” (virtual) Australasian Fluid Mechanics Seminar Series, October 2020.

“Shock-induced phenomena in turbulent flows through numerical simulation and diagnostics.” (virtual) CTR Tea Seminar, Center for Turbulence Research, Stanford University, September 2020.

“Numerical simulation of shock-induced turbulent mixing and interactions with flexible panels” Mechanical Engineering Department Seminar, University of California, Santa Barbara, March 2020.

“Numerical simulations of the interactions between shock waves and turbulence” Mechanical Engineering Department Colloquium, University of California, Riverside, December 2017.

“Numerical simulations of the interactions between shock waves and turbulent boundary layers in a nearly-square duct” Fluid Mechanics Seminar Stanford University, Stanford, November 2016.

“Numerical simulations of the interactions between shock waves and turbulent boundary layers in a nearly-square duct” Fluid Mechanics and Combustion Series Seminar University of California, San Diego, October 2016.

“Compressible turbulence, shock-turbulence interaction and hypersonics” Tutorial for the 2016 Summer Program, Center for Turbulence Research, Stanford University, Stanford, California, July 2016.

“Numerical simulations of shock/turbulent-boundary layer interaction in a nearly-square duct” GALCIT Colloquium, California Institute of Technology, Pasadena, California, October 2015.

“Integrated simulation and diagnostics of multi-physics turbulent fluid flows: from the geometry of turbulence to hypersonic flight propulsion” Department of Aerospace and Mechanical Engineering Seminar, University of Southern California, Los Angeles, California, February 2014.

“Compressible Flow Solvers and Uncertainty Analysis on Million-Core Architectures” Applied Modeling & Simulation (AMS) Seminar Series, NASA Ames Research Center, Moffett Field, California, February 2014.

“Transforming computational science software research for extreme-scale computing: Patterns and best practices - Testing and V&V”, DOE ASCR Workshop on Software Productivity for eXtreme-scale Science (SWP4XS) Washington D.C/Rockville, January 13-14, 2014.

“Continuous integration through open-source tools” High Performance Computing Seminar Series, Stanford University, April 2012.

“On the non-local geometry of turbulence” CTR Tea Seminar, Center for Turbulence Research, NASA / Stanford University, California, July 2009.

“On the non-local geometry of turbulence” Eidgenössische Technische Hochschule Zurich (ETHZ), Zurich, Switzerland, May 2008.

“On the non-local geometry of turbulence” GALCIT Colloquium, California Institute of Technology, Pasadena, CA, April 2008.

TEACHING EXPERIENCE

University of Southern California

Los Angeles, California, USA

AME 309 - Dynamics of fluids (ungraduate level course, 4 units) Fall 2016-2018, 2020-2022
 AME 511 - Compressible gas dynamics (graduate level course, 4 units) Spring 2017-2024
 AME 550 - Seminar Series in AME (graduate level course, 1 unit) Fall 2021, Spring 2022
 AME 651 - Statistical Theories of Turbulence (graduate level course, 3 units) Spring 2016

California Institute of Technology

Pasadena, California, USA

Teaching Assistant, occasional lecturer 2005 - 2007
 Ae 101 - Fluid Mechanics (graduate level course).
 Professor T. Colonius (2005-2006); Professor D. I. Pullin (2006-2007).

Educational Courses Taken

CET New Faculty Institute 2018-2019

SERVICE**Departmental Service:**

- Member, AME Ph.D. Screening Exam Committee, 2021-present
- Member, AME Merit Review Committee, 2021-2023
- Member, AME Curriculum Reform - 3-4 unit conversion 2022
- Coordinator, AME Seminar Series 2021-2022
- Member, AME Ph.D. Admissions Committee, 2020-2021, 2023-2024
- Presenter, Explore USC (prospective students) 2019-present
- Member, AME Industry Day Organizing Committee 2018
- Member, AME Curriculum Reform - Fluids Subcommittee 2016
- Observer, AME Ph.D. Admission Committee 2016, 2017
- Member, AME Faculty Search Committee 2018, 2023-2024

School and University Service:

- Chair, Viterbi School of Engineering Faculty Council, 2024-2025
- Research Computing Advisory Panel Meeting, 2024
- Appointments, Promotions and Tenure (APT)-Engineering Faculty Council (EFC) Joint Merit Review Committee, USC's Viterbi School of Engineering 2024-present
- Engineering Faculty Council (EFC) Representative (Aerospace and Mechanical Engineering Department), USC's Viterbi School of Engineering May 4, 2022-present
- Member, USC's Advanced Research Computing Program Advisory Committee (ARC-PAC) 2021-present

- Member, USC's Center for Advanced Research Computing Condo Cluster Program Executive Steering Committee (CCP-ESC) 2021-present
- Member, High-Performance Computing (HPC) Faculty Advisory Committee 2019-2021

Professional Committees:

- American Physical Society - Division of Fluid Dynamics, Frenkiel Award Committee. 2024
- Chair of the Large-Eddy Simulation (LES) Discussion Group (DG) of the Fluid Dynamics Technical Committee (FDTC) of the American Institute of Aeronautics and Astronautics (AIAA). 2022-2023
- Member of the Advisory Board of Washington Elementary STEM Magnet School (Pasadena, CA) for an NSF Magnet Grant. 2022-present
- Member of the Fluid Dynamics Technical Committee (FDTC) of the American Institute of Aeronautics and Astronautics (AIAA). 2020-2023
- Liaison of the High-Speed Air-Breathing Propulsion Technical Committee to the Fluids Dynamics Technical Committee (AIAA). 2021-2023
- Reviewer for AIAA SciTech Forum and Exposition Conference and for AIAA Aviation Forum and Exposition Conference. 2019-present.
- Reviewer for the National Science Foundation (NSF) 2021
- Reviewer for the Innovative and Novel Computational Impact on Theory and Experiment (INCITE, 2017, 2018) programs from the Department of Energy. 2017, 2018
- Reviewer for the Advanced Scientific Computing Research (ASCR) Leadership Computing Challenge (ALCC) 2016, 2023, 2024
- Reviewer for the Army Research Office (ARO) 2018
- Reviewer for the European Research Council (ERC) 2017 Starting, Consolidator and Advanced Grant Calls 2017
- User representative of the National User Facility Organization (NUFO) 2014-present
- Chair of the User Advisory Council (UAC) at Argonne Leadership Computing Facility (ALCF), Argonne National Laboratory (ANL) 2014 & 2015
- Operational Assessment Reviewer of the Argonne Leadership Computing Facilities (ALCF) at Argonne National Laboratory 2014

Conferences/Workshops:

- AIAA SciTech & Aviation Forum and Exposition Speed mentor 2022-2023
- Co-organizer of the 1st AIAA High-Fidelity CFD Verification Workshop (January 8-9, 2022). 2019-2022

- Member of the technical organizing committee of the AIAA Aviation Forum and Exposition 2021,2022
- Organizer of the AIAA Flow Visualization Showcase, held during AIAA Aviation Forum and Exposition 2021-2022
- Co-organizer of the 12th Southern California Flow Physics Symposium (SoCal Fluids XII) (87 presentations, three-parallel sessions, one-day conference) 2018
- Mentor in the International Mentoring Program established by the International Mentoring Foundation for the Advancement of Higher Education (IMFAHE) (2016)

Editorial activities:

- Co-editor of the Annual Research Briefs, Center for Turbulence Research, NASA/Stanford University 2013

PROFESSIONAL SOCIETY MEMBERSHIPS

American Institute of Aeronautics and Astronautics (AIAA), Associate Fellow.
 Association for Computing Machinery (ACM), Senior Member.
 American Physical Society (APS).

JOURNAL REVIEWER EXPERIENCE

Journal of Fluid Mechanics, Physics of Fluids, American Institute of Aeronautics and Astronautics (AIAA) Journal, Applied Mathematics and Computation, Combustion and Flame, Computers and Fluids, European Journal of Mechanics / B Fluids, Europhysics Letters, Flow, International Journal of Heat and Fluid Flow, International Journal of High Performance Computing, Journal of Aerospace Engineering, Journal of Computational Physics, Journal of Fluids and Structures, Journal of Fluids Engineering, Journal of Propulsion and Power, Ocean Engineering, Physical Review Fluids, Proceedings of the Combustion Institute, Proceedings of the National Academy of Sciences (PNAS) Nexus.

OUTREACH

Partnership with Washington STEM Magnet Elementary School, Pasadena, CA 2022-present

- “STEM Fair Judge” May 1, 2024
- “Renewable energy” March 13, 2024
- “The flows of Nature” in-classroom hands-on tutorial given to 3 separate classes each of 15 students in 4th grade. May 16, 2023
- Organized visit to USC campus for 60 4th-grade students and teachers, with classroom activities and lab tours in the AME Department. May 4, 2023
- “Forces of flight” in-classroom hands-on tutorial given to 3 separate classes each of 15 students in 4th grade. January 31, 2023
- “Fluid flows” in-classroom presentations given to 6 separate classes of 15 students from 4th and 5th grades. September 26, 2022

Organized half-day event for USC students to learn about career opportunities at Sandia National Laboratories, through informational session and meetings with visiting scientist. May 2023

Project Payload K-12 STEM Center Event at USC: Guest Lecture October 29, 2022
“An Introduction to Engineering: Fluid Flows” Presentation given to 15 middle-school female students.

Partnership with Washington STEM Magnet Elementary School, Pasadena, CA, Spring 2018
“Linux, Python, and Supercomputing Tutorial Series”
Eight-week tutorial series for 15 students in 3rd-5th grades.

STEM Spotlight AME at USC, Presentation “Flying Faster,” to student groups from participating high-schools (Diamond Bar High School, STEM Academy of Boyle Heights, STEM Academy of Hollywood, Manual Arts High School), October 12, 2017

STEM Academy of Hollywood Project Showcase, Los Angeles Unified School District (LAUSD)
Project Based Learning Judge
10th-grade “Driving to the Future Engineering Gallery,” May 15, 2017
Health Fair December 7, 2016

“A career in aerospace engineering” AIAA USC Chapter, Signature Speaker Series University of Southern California November 2016

OTHER ACTIVITIES AND SKILLS

Private Pilot.