



Exponent[®]
Engineering & Scientific Consulting

Eylul Bilgin, Ph.D.

Associate | Thermal Sciences
Menlo Park
+1-650-688-7243 | ebilgin@exponent.com

Professional Profile

Dr. Bilgin is an Aeronautical Engineer with expertise in transitional and turbulent flows, fluid mechanics, thermodynamics, and aircraft design. She has experience in turbulence modelling, aircraft performance assessment and UAV design. She has also taught courses in fluid mechanics, aerodynamics, techniques of failure analysis, aircraft and rocket propulsion, and aerospace structural analysis.

Prior to joining Exponent, Dr. Bilgin completed her Ph.D. thesis at Stanford University developing theoretical tools to aid in the understanding, modeling, and computation of high Reynolds number turbulent flows. During this time, she also contributed to the literature the most accurate version of the Moody diagram used extensively by practicing mechanical engineers through her work in turbulent flows over rough walls. Additionally, she aided in the development of a novel integral boundary layer method that accurately captures the mean properties of turbulent flows at any Reynolds number and enables the computation without the use of a supercomputer. These studies highlight her mathematical and physical modelling skills. During her graduate studies at Stanford, Dr. Bilgin engaged in extensive teaching activities as well. She held a visiting faculty position at UC San Diego for two summer sessions, teaching Aerodynamics and Advanced Fluid Mechanics to senior Aerospace Engineering students.

Academic Credentials & Professional Honors

Ph.D., Aeronautics and Astronautics, Stanford University, 2023

M.S., Aeronautics and Astronautics, Stanford University, 2022

B.S., Aerospace Engineering, University of California, San Diego, 2017

Graduate Engineering Award, Stanford University (2018)

Dr. James Rankin Digital Avionics Scholarship, AIAA (2016)

Licenses and Certifications

Certified Fire and Explosion Investigator (CFEI)

Academic Appointments

Visiting Faculty, Mechanical and Aerospace Engineering, University of California San Diego, 2022

Professional Affiliations

American Institute of Aeronautics and Astronautics (Member)

Publications

Bilgin, Eylül, Jacob T. Needels, and Brian Cantwell. "Application of a Boundary Layer Integral Method Based on the Universal Velocity Profile to Drag Prediction for Three-dimensional Wings." AIAA AVIATION 2023 Forum. 2023.

Bilgin, Eylul, and Brian J. Cantwell. "Application of the Universal Velocity Profile to rough-wall pipe flow." Physics of Fluids 35.5 (2023).

Korneyeva, Veronika, , D Dyrda, J Wall, E Bilgin, BJ Cantwel. "Laser Ignition of Hybrid Rocket Motors: Ignition Characterization and Ignition Mechanism Analysis." AIAA SCITECH 2023 Forum. 2023.

Cantwell, Brian J., Eylul Bilgin, and Jacob T. Needels. "A new boundary layer integral method based on the universal velocity profile." Physics of Fluids 34.7 (2022).

Bilgin, Eylul, and Brian J. Cantwell. "Quantification of Scale Separation of Turbulent Wall Flows Using the Spectrum of Universal Velocity Profile." AIAA SCITECH 2022 Forum. 2022.

Bilgin, Eylul, and Brian Cantwell. "Combustion of Liquefying Hybrid Propellants: Long-Wave Instabilities of Sheared Liquid Films Subject to Blowing." AIAA Propulsion and Energy 2020 Forum. 2020

Presentations

Bilgin, Eylül, Jacob T. Needels, and Brian Cantwell. "Application of a Boundary Layer Integral Method Based on the Universal Velocity Profile to Drag Prediction for Three-dimensional Wings." AIAA AVIATION 2023 Forum. 2023.

Bilgin, Eylul, and Brian J. Cantwell. "Quantification of Scale Separation of Turbulent Wall Flows Using the Spectrum of Universal Velocity Profile." AIAA SCITECH 2022 Forum. 2022.

Bilgin, Eylul. "Turbulence in Aircraft and Missiles." Lecture, Aerospace Summit, Etkin Kampus, Ankara, Turkey, 27 Mar. 2021.

Bilgin, Eylul, and Brian Cantwell. "Combustion of Liquefying Hybrid Propellants: Long-Wave Instabilities of Sheared Liquid Films Subject to Blowing." AIAA Propulsion and Energy 2020 Forum. 2020

Project Experience

- Carried out a thorough aircraft performance analysis for a solar powered electric UAV.
- Designed thermodynamic cycles for high bypass ratio turbofan engines.
- Aided in the aerodynamic design and analysis of a blended wing-body aircraft

Peer Reviews

Physics of Fluids