



Brian Cantwell

Edward C. Wells Professor in the School of Engineering and Professor of Mechanical Engineering, Emeritus
Aeronautics and Astronautics

CONTACT INFORMATION

- **Administrator**

Carolyn Edwards - Administrative Associate

Email edwardsc@stanford.edu

Tel (650) 723-2867

Bio

BIO

Professor Cantwell's research interests are in the area of turbulent flow. Recent work has centered in three areas: the direct numerical simulation of turbulent shear flows, theoretical studies of the fine-scale structure of turbulence, and experimental measurements of turbulent structure in flames. Experimental studies include the development of particle-tracking methods for measuring velocity fields in unsteady flames and variable density jets. Research in turbulence simulation includes the development of spectral methods for simulating vortex rings, the development of topological methods for interpreting complex fields of data, and simulations of high Reynolds number compressible and incompressible wakes. Theoretical studies include predictions of the asymptotic behavior of drifting vortex pairs and vortex rings and use of group theoretical methods to study the nonlinear dynamics of turbulent fine-scale motions. Current projects include studies of fast-burning fuels for hybrid propulsion and decomposition of nitrous oxide for space propulsion.

ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Aeronautics and Astronautics
- Affiliate, Precourt Institute for Energy
- Affiliate, Stanford Woods Institute for the Environment

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Elected Member, National Academy of Engineering (2013 - present)

PROFESSIONAL EDUCATION

- PhD, Caltech (1976)

LINKS

- <https://web.stanford.edu/~cantwell/>: <https://web.stanford.edu/~cantwell/>

Teaching

COURSES

2023-24

- Aircraft and Rocket Propulsion: AA 283 (Spr)

Publications

PUBLICATIONS

- **Integral measures of the zero pressure gradient boundary layer over the Reynolds number range $0 \leq R\text{-}\tau < \infty$** *PHYSICS OF FLUIDS*
Cantwell, B. J.
2021; 33 (8)
- **Diode Laser Ignition Mechanism for Hybrid Propulsion Systems**
Dyrda, D. M., Korneyeva, V., Cantwell, B. J.
AMER INST AERONAUTICS ASTRONAUTICS.2020: 901–11
- **Diode Laser Ignition of a Poly(Methyl Methacrylate) and Gaseous Oxygen Hybrid Motor** *JOURNAL OF PROPULSION AND POWER*
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- **Optically Resolved Fuel Regression of a Clear Polymethylmethacrylate Hybrid Rocket Motor** *JOURNAL OF PROPULSION AND POWER*
Mechentel, F. S., Hord, B. R., Cantwell, B. J.
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- **Hypergolic Ignition of Lithium-Aluminum-Hydride-Doped Paraffin Wax and Nitric Acid** *JOURNAL OF PROPULSION AND POWER*
Stober, K., Cantwell, B. J., Otaibi, R. A. L.
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- **Experimental Visualization of Hybrid Combustion: Results at Elevated Pressures** *JOURNAL OF PROPULSION AND POWER*
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- **Experimental and numerical methods for radiative wall heat flux predictions in paraffin-based hybrid rocket engines**
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- **Hybrid rocket propulsion systems for outer planet exploration missions** *ACTA ASTRONAUTICA*
Jens, E. T., Cantwell, B. J., Hubbard, G. S.
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- **Symmetries and analytical solutions of the Hamilton-Jacobi-Bellman equation for a class of optimal control problems** *OPTIMAL CONTROL APPLICATIONS & METHODS*
Rodrigues, L., Henrion, D., Cantwell, B. J.
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- **Schlieren and OH* chemiluminescence imaging of combustion in a turbulent boundary layer over a solid fuel** *EXPERIMENTS IN FLUIDS*
Jens, E. T., Miller, V. A., Cantwell, B. J.

2016; 57 (3)

- **A new boundary layer integral method based on the Universal Velocity Profile** *Physics of Fluids*
Cantwell, B. J., Bilgin, E., Needels, J. T.
2022
- **Similarity solution of fuel mass transfer, port mass flux coupling in hybrid propulsion** *JOURNAL OF ENGINEERING MATHEMATICS*
Cantwell, B. J.
2014; 84 (1): 19-40
- **Nitrogen removal with energy recovery through N₂O decomposition** *ENERGY & ENVIRONMENTAL SCIENCE*
Scherson, Y. D., Wells, G. F., Woo, S., Lee, J., Park, J., Cantwell, B. J., Criddle, C. S.
2013; 6 (1): 241-248
- **Hybrid rocket propulsion and in-situ propellant production for future Mars missions**
BOIRON, A., J., CANTWELL, B., J.
2013
- **Review and evaluation of models for self-pressurizing propellant tank dynamics**
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2012
- **Visualization of the liquid layer combustion of paraffin fuel for hybrid rocket applications**
CHANDLER, A., A., JENS, E., CANTWELL, B., J., HUBBARD, G., S.
2012
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ZIMMERMAN, J., E., CANTWELL, B., J., ZILLIAC, G.
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- **High performance hybrid upper stage motor**
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- **Recent advances In hybrid propulsion.** *International Journal of Energetic Materials and Chemical Propulsion*
CANTWELL, B., J., KARABEYOGLU, M., A., ALTMAN, D., A
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- **A Small-scale planar nitrous oxide monopropellant thruster for “green” propulsion and power generation**
SCHERSON, Y., D., LOHNER, K., CANTWELL, B., J., KENNY, T.
2010
- **A two-stage single port hybrid propulsion system for a Mars ascent vehicle**
CHANDLER, A., CANTWELL, B., J., HUBBARD, G., S.
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- **A monopropellant gas generator based on N₂O decomposition for “green” propulsion and power applications**
SCHERSON, Y., D., LOHNER, K., CANTWELL, B., J., KENNY, T.
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- **Status update report for the Peregrine sounding rocket project: part III**
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- **Recent Advances In Hybrid Propulsion.**
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- **Design of an orbital hybrid rocket vehicle launched from Canberra air platform**
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- **Scale-up tests of high regression rate paraffin-based hybrid rocket fuels** *AIAA 41st Aerospace Sciences Meeting and Exhibit*
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KARABEYOGLU, M., A., DEZILWA, S., CANTWELL, B., J., ZILLIAC, G.
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