Stanford

Brian Cantwell

Edward C. Wells Professor in the School of Engineering and Professor of Mechanical Engineering

Aeronautics and Astronautics

CONTACT INFORMATION

- **Administrator**

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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

- Professor, Aeronautics and Astronautics
- Professor, Mechanical Engineering
- 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

- http://www.stanford.edu/~cantwell/: http://www.stanford.edu/~cantwell/

Teaching

COURSES

2019-20

- Advanced Rocket Propulsion: AA 284A (Win)
- Aircraft and Rocket Propulsion: AA 283 (Win)
- Fundamentals of Compressible Flow: AA 210A (Aut)
- Introduction to Symmetry Analysis: AA 218 (Spr)

2018-19

- Air and Space Propulsion: AA 103 (Spr)
- Aircraft and Rocket Propulsion: AA 283 (Win)
- Fundamentals of Compressible Flow: AA 210A (Aut)

2017-18

- Aircraft and Rocket Propulsion: AA 283 (Win)
- Fundamentals of Compressible Flow: AA 210A (Aut)
- Introduction to Symmetry Analysis: AA 218 (Spr)

2016-17

- Aircraft and Rocket Propulsion: AA 283 (Win)
- Fundamentals of Compressible Flow: AA 210A (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Jae hwan Choi, Sean Young

Orals Evaluator

Jae hwan Choi

Doctoral Dissertation Advisor (AC)

Ashley Coates, David Dyrda, Laura Simurda, Matt Subrahmanyam

Master's Program Advisor

Andy Castillo, Adrian Costantino, Andrew Denig, Holly Dinkel, Kevin Ellis, Andrew Gatherer, Andy Kim, Veronika Korneyeva, Jeff Robinson, Tal Schwartz, Ethan Strijbosch, Zacharia Tuten, Preston Wang

Doctoral Dissertation Co-Advisor (AC)

Diana Juarez Madera

Publications

PUBLICATIONS

- **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.
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- **Review and evaluation of models for self-pressurizing propellant tank dynamics**
  ZIMMERMAN, J., E., WAXMAN, B., S., CANTWELL, B., J., ZILLIAC, G.
  2013
- **Hybrid rocket propulsion and in-situ propellant production for future Mars missions**
  BOIRON, A., J., CANTWELL, B., J.
  2013
- **Mass flow rate and isolation characteristics of injectors for use with self-pressurizing oxidizers in hybrid rockets**
  WAXMAN, B., S., ZIMMERMAN, J., E., CANTWELL, B., J., ZILLIAC, G.
  2013
- **Similarity solution of fuel mass transfer, port mass flux coupling in hybrid propulsion.** *Journal of Engineering Mathematics*
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- **A thermal model for analysis and control of drilling in icy formations on mars** *PLANETARY AND SPACE SCIENCE*
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- **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
- **Initial experimental investigations of self-pressurizing propellant dynamics**
  ZIMMERMAN, J., E., CANTWELL, B., J., ZILLIAC, G.
  2012
- **Peregrine Hybrid Rocket Motor Ground Test Results**
  ZILLIAC, G., WAXMAN, B., S., DYER, J., KARABEYOGLU, M., A., CANTWELL, B., J.
  2012
- **Effects of injector design and impingement techniques on the atomization of self-pressurizing oxidizers**
  WAXMAN, B., S., CANTWELL, B., J., ZILLIAC, G.
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- **Feasibility of a single port Hybrid Propulsion system for a Mars Ascent Vehicle** *ACTA ASTRONAUTICA*
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- **High performance hybrid upper stage motor**
  KARABEYOGLU, M., A., STEVENS, J., GEYZEL, D., CANTWELL, B., J
  2011
- **Hybrid propulsion for solar system exploration**
  CHANDLER, A., A., CANTWELL, B., J., HUBBARD, G., S.
  2011
- **Thin film stability of melting solid fuels with application to hybrid propulsion**
  CANTWELL, B., J.
  2011
- **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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- **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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  DORAN, E., DYER, J., MARZONA, M., T., KARABEYOGLU, M., A., ZILLIAC, G., MOSHER, R., Cantwell, B. J.
  2009
- **Recent Advances In Hybrid Propulsion.**
  CANTWELL, B., J., KARABEYOGLU, M., A., ALTMAN, D., A.
  2009
- **A monopropellant gas generator based on N2O decomposition for “green” propulsion and power applications**
  SCHERSON, Y., D., LOHNER, K., CANTWELL, B., J., KENNY, T.
  2009
- **Modeling of N2O decomposition events**
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  2008
- **Development of scalable space-time averaged regression rate expressions for hybrid rockets** *AIAA/ASME/SAE/ASEE 41st Joint Propulsion Conference*
  Karabeyoglu, M. A., Cantwell, B. J., Zilliac, G.
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- **Gravity currents in horizontal porous layers: transition from early to late self-similarity** *JOURNAL OF FLUID MECHANICS*
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  DUNN, Z., DYER, J., LOHNER, K., DORAN, E., Cantwell, B. J.
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- **Nitrous oxide hybrid rocket motor fuel regression rate characterization**
  DORAN, E., DYER, J., LOHNER, K., DUNN, Z., CANTWELL, B., J., ZILLIAC, G.
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- **Design and development of a sub-scale nitrous oxide monopropellant gas generator**
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  DYER, J., DORAN, E., DUNN, Z., LOHNER, K., ZILLIAC, G., CANTWELL, B., J.
  2007
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- **Design of an orbital hybrid rocket vehicle launched from Canberra air platform**
  KARABEYOGLU, M., A., FALCONER, T., CANTWELL, B., J., STEVENS, J.
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- **Evaluation of the homologous series of normal-alkanes as hybrid rocket fuels**
  KARABEYOGLU, M., A., CANTWELL, B., J., STEVENS, J.
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  CHENG, W., CANTWELL, B., J.
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