Biography

Damon Honnery is Deputy Dean Operations in the Faculty of Engineering, a Professor in the Department of Mechanical and Aerospace Engineering, and he jointly directs the Laboratory for Turbulence Research in Aerospace and Combustion. He obtained his undergraduate degree in mechanical engineering from the University of Sydney in 1985. Following this he was employed as a research fellow at the University of Sydney during which he obtained a MEngSc in 1987. In 1987 he was awarded a cadet research scientist position in the Aeronautical Research Laboratory (ARL-DSTO, now DSTG) during which he obtained his PhD in gas turbine related research from the University of Sydney in 1992. This was followed by an appointment as a research scientist at ARL in the Propulsion Branch where he undertook research on soot formation in gas turbines systems. In 1993 he took up a lectureship at Monash University at the Caulfield Campus, he then moved to the Clayton Campus in 1999 where he established the Monash Aerospace Engineering Degree. With Julio Soria he jointly established the Laboratory for Turbulence Research in Aerospace and Combustion in 1999. In the Department of Mechanical and Aerospace Engineering he has been Aerospace Course Director, Director of Undergraduate Affairs, Director of Research, and Deputy Head. In the Faculty of Engineering he has played a leading role in the development of the Monash Makerspace and was Interim Joint Director of the Woodside-Monash Energy Partnership. His research interests range from spray systems, particle flows, pollutant formation, renewable energy and climate change mitigation.

Qualifications

Research output

Making energy green – a method for quantifying the ecosystem maintenance energy and the green energy return on energy invested

Porous medium applications in internal combustion engines: a review

Life-cycle greenhouse gas emissions and net energy assessment of large-scale hydrogen production via electrolysis and solar PV

Combining modelling with advanced experimental techniques to optimize formulation and nozzle design for low GWP pMDIs

Using the Plateau-Rayleigh Instability to Produce HFA152a Droplets

The risk of catastrophic climate change: Future energy implications
Moriarty, P. & Honnery, D., Apr 2021, In: Futures. 128, 102728.

Increasing the fine particle fraction of pressurised metered dose inhaler solutions with novel actuator shapes

The limits of renewable energy
The generation of screech tones by shock leakage

Feasibility of a 100% global renewable energy system

Influence of pressure transducer protrusion depth on pressure measurements of shock waves in shock tubes

Acoustic pMDI Patient Guidance Device: Impact on Drug Delivery

Evaluation of shock dividers using numerical and experimental methods

Multimodal X-ray and laser diagnostics for pressurized metered dose inhaler sprays

Redistribution of transient shock waves using shock dividers

Understanding flow rate influence on clip-tone guided inhaler delivery

X-ray and optical assessment of alternative propellant p-152A in pMDI sprays

Effect of turbulence on drop breakup in counter air flow

The influence of cylindrical spray chamber geometry on the evolution of high pressure diesel sprays

Energy efficiency or conservation for mitigating climate change?

Thermodynamic modeling and validation of in-cylinder flow in diesel engines

Ecosystem maintenance energy and the need for a green EROI

Drug distribution transients in solution and suspension-based pressurised metered dose inhaler sprays
Advanced numerical analyses on thermal, chemical and dilution effects of water addition on diesel engine performance and emissions utilizing artificial inert species

Impact of coherence decay on wavepacket models for broadband shock-associated noise in supersonic jets

Nozzle external geometry as a boundary condition for the azimuthal mode selection in an impinging underexpanded jet

Equivalent shock-associated noise source reconstruction of screeching underexpanded unheated round jets

Correlation analysis of high-resolution particle image velocimetry data of screeching jets

A parabolised stability equation based broadband shock-associated noise model

Bioenergy with carbon capture and storage in a future world

Energy Accounting for a Renewable Energy Future

Global renewable energy resources and use in 2050

New Energy Technologies: Microalgae, Photolysis and Airborne Wind Turbines

Plateau-Rayleigh breakup of supercooled refrigerant droplets

Prospects for hydrogen as a transport fuel

Signatures of shear-layer unsteadiness in proper orthogonal decomposition

Upstream-travelling acoustic jet modes as a closure mechanism for screech
An experimental investigation of coupled underexpanded supersonic twin-jets

Coupling modes of an underexpanded twin axisymmetric jet

Dynamic stall in vertical axis wind turbines: Scaling and topological considerations

Energy policy and economics under climate change

Kinematic wavepacket model for broadband shock associated noise in underexpanded supersonic jets

Sound production by shock leakage in supersonic jet screech

Chamber geometry effect on non-evaporating diesel spray evolution

Creating environmentally sustainable cities: Not an easy task

Synchrotron x-ray measurements of pMDI sprays: enabling improved nozzle design

The effect of jet exit pressure ratio on a jet in cross flow

Three futures: Nightmare, diversion, vision

State of charge estimation for battery packs using H-infinity observer in underground mine electric vehicles

Spray flow structure from twin-hole diesel injector nozzles

Stability and three-dimensional evolution of a transitional dynamic stall vortex
Multi-zone model for diesel engine simulation based on chemical kinetics mechanism

Revealing pMDI Spray Initial Conditions: Flashing, Atomisation and the Effect of Ethanol

An explanation for the phase lag in supersonic jet impingement

A study of the relationship between NOx and the ion current in a direct-injection diesel engine

Fuzzy parameter tuning sliding mode control for longitudinal motion of underground mining electric vehicles based on a single wheel model

Review: Assessing the climate mitigation potential of biomass

Engine tail pipe particulate emissions and fault detection using an ion current sensor

High-speed x-ray imaging of pressurized metered-dose inhaler sprays with variable ethanol content

Improved predictions of broadband shock associated noise in supersonic jets

Novel method for investigating broadband velocity fluctuations in axisymmetric screeching jets

On the Application of Shock-Associated Noise Models to PIV Measurements of Screeching Axisymmetric Cold Jets

On the effects of nozzle lip thickness on the azimuthal mode selection of a supersonic impinging flow

Particle image velocimetry analysis of the twin supersonic jet structure and standing-wave

Supersonic jet noise: An investigation into noise generation mechanisms using large eddy simulation and high-resolution PIV data
Sustainable energy resources: Prospects and policy

Ultra high speed investigation of gaseous jet injected by a single-hole injector and proposing of an analytical method for pressure loss prediction during transient injection

H-infinity observer based state of charge estimation for battery packs in electric vehicles

Impingement tones and associated shock instabilities in supersonic plug nozzle flows

Can renewable energy power the future?

Insights into Spray Development from Metered-Dose Inhalers Through Quantitative X-ray Radiography

Temporally and Spatially Resolved x-ray Fluorescence Measurements of in-situ Drug Concentration in Metered-Dose Inhaler Sprays

Nontechnical aspects of household energy reductions

Reducing personal mobility for climate change mitigation

Social efficiency in energy conservation

A novel method for decoupling the velocity fluctuations in screeching axisymmetric jets

Acoustic unsteadiness of sprays from pressurised metered-dose inhalers
Efficiency of the lumped parameter concept and the role of liquid properties in modelling microdroplet evaporation

Experimental study of surface heating by a high speed exhaust plume

Global transport energy consumption

Interaction of a supersonic underexpanded jet with a flat plate

PIV analysis of coupled supersonic twin-jets

Sliding mode control of longitudinal motions for underground mining electric vehicles with parametric uncertainties

Spatially differentiated energy and environment comparison of diesel and electric buses

Supersonic jet impingement on a cylindrical surface

Uncertainty, utopia, and our contested future

Fuzzy Sliding Mode Control for longitudinal motion of underground mining electric vehicles

[Viewpoint] Reliance on technical solutions to environmental problems: Caution is needed

Shock structures and instabilities formed in an underexpanded jet impinging on to cylindrical sections

A simplified mechanism for the prediction of the ion current during methane oxidation in engine-like conditions
Airframe surface heating by a high speed micro gas turbine exhaust plume - preliminary results

An investigation of the turbulent integral length scales in an underexpanded axisymmetric jet

Back-illumination imaging of pressurised metered-dose inhaler sprays

Common rail diesel sprays from twin-hole nozzle

Droplet breakup in turbulent counterflow

Effect of impinging angle on non-evaporative diesel wall-jet

Effects of nozzle lip thickness on the global modes of an impinging supersonic jet

Equity and energy in global solutions to climate change

Future cities in a warming world

High resolution PIV measurements of an impinging underexpanded supersonic jet

Measurement of density in axisymmetric jets using a novel background-oriented schlieren (BOS) technique

Measuring shear layer growth rates in aeroacoustically forced axisymmetric supersonic jets

Modeling of the ion current developed in a direct-injection diesel engine
Multimodal instability in the weakly underexpanded elliptic jet

Pressurised metered-dose inhaler spray structure

Reynolds stress anisotropy in shock-containing jets

Self-organising map based classification of LiFePO4 cells for battery pack in EV

Staging behaviour in screeching elliptical jets

The growth of instabilities in annular liquid sheets

Turbojet exhaust plume heat transfer

A novel high-speed imaging technique to predict the macroscopic spray characteristics of solution based pressurised metered dose inhalers

Application of a multi-step soot model in a thermodynamic diesel engine model

Clustering LiFePO4 cells for battery pack based on neural network in EVs

Coherent structure and sound production in the helical mode of a screeching axisymmetric jet

Future Earth: declining energy use and economic output

Instability modes in screeching elliptical jets

Reconnecting technological development with human welfare
Sensitivity analysis of potential fuel savings by implementation of fuel economy standards for motorcycle

Sliding mode control for longitudinal motion of underground mining electric vehicles

The Earth we are creating

The prediction of torque in a diesel engine using ion currents and artificial neural networks

The role of porous media in homogenization of high pressure diesel fuel spray combustion

The underexpanded jet Mach disk and its associated shear layer

A comparison of two NOx prediction schemes for use in diesel engine thermodynamic modelling

A reduced ionic mechanism for methane oxidation

An investigation into the influence of environmental conditions on the performance of a hybrid-electric unmanned aircraft

Detailed soot emissions predictions from a thermodynamic diesel engine model

Geoeengineering and carbon sequestration: Solutions for fossil fuel emissions?

Greening passenger transport: a review

Innovative and human-centred design in underground coalmining: a new concept vehicle for safe personnel transport

Microdroplet evaporation under increasing temperature conditions: experiments and modelling
Modelling of electric vehicles for underground mining personnel transport

Near-field structure of underexpanded elliptic jets

The global environmental crisis of transport

Time resolved characteristics of gaseous jet injected by a group-hole nozzle

Transesterification of waste cooking oil: process optimization and conversion rate evaluation

Mitigating climate change

Reducing transport's impact on climate change

Preface

An error analysis of the dynamic mode decomposition

Biorefinery design from an earth systems perspective

Carbon sequestration in an uncertain world

Development of a hybrid-electric power-system model for a small surveillance aircraft

Empirical scaling analysis of atomising annular liquid sheets

Energy efficiency: lessons from transport
Experimental investigation of nonlinear instabilities in annular liquid sheets

Fundamental questions for hydrogen production

Homogenisation of high pressure diesel fuel spray combustion using porous ceramic media

Hydrogen Production - Prospects and Processes

Life cycle cost and sensitivity analysis of palm biodiesel production

Preparing for a low-energy future

The visualization of the acoustic feedback loop in impinging underexpanded supersonic jet flows using ultra-high frame rate schlieren

What is the global potential for renewable energy?

A comparison of subpixel edge detection and correlation algorithms for the measurement of sprays

A correlation image velocimetry-based study of high-pressure fuel spray tip evolution

Energy availability problems with rapid deployment of wind-hydrogen systems

Is there an optimum level for renewable energy?

Measuring evaporation of micro-fuel droplets using magnified DIH and DPIV

Mitigating climate change

Particle relaxation and its influence on the particle image velocimetry cross-correlation function
Reducing transport's impact on climate change

Rise and Fall of the Carbon Civilisation: Resolving Global Environmental and Resource Problems

The transition to renewable energy: Make haste slowly

Three-dimensional substructure in a leading edge vortex

A cross-correlation velocimetry technique for breakup of an annular liquid sheet

A human needs approach to reducing atmospheric carbon

A hydrogen standard for future energy accounting?

Axial plus tangential entry swirling jet

Empirical and theoretical analysis of the stability of an air-assisted atomising annular liquid sheet spray systems

Why technical fixes won't mitigate climate change

A Global Perspective on Biomass Gasification

A PIV-Based Approach to the Stability Analysis of Multiphase Flows

Characterisation of diesel sprays impinging on a flat plate

Diesel Engine Performance of Pyrolysis Oil-Diesel Blends

Effect of nozzle transients and compressibility on the penetration of fuel sprays
Estimating global hydrogen production from wind

Hydrogen's role in an uncertain energy future

Renewable energy in a warming world

Time resolved measurements of the initial stages of fuel spray penetration

Use of MDIH for the measurement of diesel droplet evaporation rates

Velocity Measurement of Fuel Micro-Droplets Undergoing Evaporation using MDIH-PIV

What energy levels can the Earth sustain?

Axial Plus Tangential Entry Swirling Jet

Characterisation of the mean flow of a micro-injector induced swirling jet

Combustion of bio-oil ethanol blends at elevated pressure

Direct numerical simulation of passive scalar mixing in axisymmetric swirling jets

High-speed visualisation of primary break-up of an annular liquid sheet

Instabilities in Underexpanded Impinging Jets

Low-mobility: The future of transport

Magnified Digital Inline Holographic Measurement of Micro Droplets
Mitigating greenhouse: limited time, limited options

PIV Investigation of Grid Turbulence

Performance of a DI diesel engine fuelled by blends of diesel and kiln-produced pyrolygenous tar

The prospects for global green car mobility

Australian car travel: an uncertain future

Direct numerical simulation of passive scalars mixing in an axisymmetric swirl induced vortex breakdown flow

Effect of leading-edge zero-net-mass-flux excitation on delta wing vortex structures

Global bioenergy: problems and prospects

Intermittent renewable energy: the only future source of hydrogen?

Liquid fuels from woody biomass

Micro-droplet and dense fuel spray diagnostics

Study of underexpanded supersonic jets with optical techniques

The influence of high injection pressure on the combustion of diesel water emulsions

Combustion properties of slow pyrolysis bio-oil produced from indigenous Australian species
Heat release and emission characteristics of water-oil emulsion in direct injection diesel engine

Performance, emissions and heat release characteristics of direct injection diesel engine operating on diesel oil emulsion

Analysis of the pre-conditions for micro-explosions of bio-oil droplets

A comparison of biomass energy with other renewables

Can renewable energy avert global climate change?

Determinants of urban travel in Australia

Diesel oil emulsion as an alternative to diesel fuel

Direct numerical simulation of passive scalars mixing in a spatially evolving axisymmetric vortex breakdown flow

Heat release model for the combustion of diesel oil emulsions in di diesel engines

High pressure spray combustion of bio-oil/ethanol blends

Investigation of flow past a cavity using PLIF and MCCDPIV

Non-Intrusive measurement of a density field using the Background Oriented Schlieren (BOS) method

PLIF and PIV investigation on pulsed sprays at isothermal conditions

Particle image velocimetry measurements of an underexpanded supersonic jet
Reducing emissions in Victorian diesel vehicles

Soot and temperature measurement in diesel sprays

Study of heat release characteristics in direct injection diesel engine fueled by diesel oil emulsion

Velocity and scalar measurement of low swirl jet

Visualization of flow development in hybrid rocket motors with high regression rates

Autocorrelation functions and the determination of integral length with reference to experimental and numerical data

Effect of pulsation rate on spray-spreading rate in an isothermal environment

Forecasting world transport in the year 2050

Future vehicles: an introduction

Mean flow characteristics of a micro-injector induced swirling jet

Radiant heating of a bio-oil droplet: a quest for a suitable model and scaling of pre-explosion conditions

The stability of low Reynolds number round jets

Alternative transport fuels: the long-term future

Effect of oxidising flow velocity and burning rate on flow structure in an isothermal model of a high regression rate hybrid rocket motor
Near jet characterisation of a micro-injector controlled swirling jet

Safety impacts of vehicular information technology

World alternative energy potential: combustion implications

Evaluation of greenhouse gas reduction strategies for urban passenger transport

MCCDPIV investigations of a round jet at low Reynolds number

Near field PIV measurements of a bluff body co-flowing round axisymmetric jet

The application of laser diagnostic in the laboratory for turbulence research in aerospace and combustion

The role of LPG in reducing vehicle exhaust emissions

Structures in a round homogeneous jet at low Reynolds number

A Parametric Study of Soot Formation and Radiation Heat Transfer in C2H4 Jet Flames at Pressure

Combustion in the 21st Century

Proc. of the Second Australian Conf. on Laser Diagnostics in Fluid Mechanics & Combustion

Slower, Smaller and Lighter Urban Cars
Greenhouse gas implications of alternative transport fuels

Measurements of velocity and vorticity in grid turbulence using PIV

Transport and the urban environment

Soot mass growth in laminar diffusion flames - parametric modelling

Two parametric models of soot growth rates in laminar ethylene diffusion flames

Modeling the growth of polynuclear aromatic hydrocarbons in diffusion flames

Soot mass growth modelling in laminar diffusion flames

Soot formation rates in diffusion flames— a unifying trend

A soot formation rate map for a laminar ethylene diffusion flame

Soot formation in long ethylene diffusion flames

Furnace flow modelling: physical and computational

Soot and Mixture Fraction in Turbulent Diffusion Flames

Projects
Characterising particulate laden flow in the lung airways: from drug delivery to primary anthropogenic sources
Stewart, P., Chan, H., Honnery, D., Larson, I., Soria, J., Thompson, B. & Young, P. J.
Australian Research Council (ARC), Monash University, University of Sydney
1/01/06 → 31/12/06

Enabling precise droplet control in hydrofluorocarbon free sprays
Duke, D., Honnery, D., Young, P. M., Stein, S., Myatt, B. & Gavtash, B.
18/06/21 → 17/06/24
**Multi-drug dry powder inhalation systems for effective treatment of chronic obstructive pulmonary disease**
Stewart, P., Honnery, D., Traini, D. & Young, P. J.
Australian Research Council (ARC)
1/01/12 → 31/12/14

**The art of controlling multijet resonance in jet noise and power generation**
Australian Research Council (ARC)
26/04/19 → 31/12/22

**WMEP-IT-2A-017 Hydrogen Value Chain Design**
Garcia De La Banda, M., Belov, G., Czauderna, T., Palmer, G., Wang, C. & Honnery, D.
2/08/21 → 30/09/21