

CV date

25 MAY 2023

Part A. PERSONAL INFORMATION

First and family name	Wilfried Coenen	
Researcher codes	Open Researcher and Contributor ID (ORCID)	0000-0002-2693-6574 (link)
	SCOPUS Author ID	36830307600 (link)
	WoS Researcher ID	ABG-8147-2020

A.1. Current position

Name of University / Institution	Universidad Carlos III de Madrid		
Department	Departamento de Ingeniería Térmica y de Fluidos		
Address and Country	Av. Universidad 30, 28911 Leganés (Madrid), Spain		
Phone number	91 624 9158	E-mail	wcoenen@ing.uc3m.es
Current position	Associate Professor ('Profesor Titular de Universidad')	From	August 2020
Keywords	Fluid mechanics, biofluid mechanics, cerebrospinal fluid flow, hydrodynamic instability, reactive flows, fire whirls, jets		

A.2. Previous positions

Period	Position • Institution • Country
2019 - 2020	Assitant profesor ('Profesor Visitante') • Universidad Carlos III de Madrid • Spain
2015 - 2019	Postdoctoral Scholar • University of California San Diego • USA
2011 - 2015	Assitant profesor ('Profesor Ayudante Doctor') • Universidad Carlos III de Madrid • Spain
2010 - 2011	Postdoctoral Researcher • Universidad de Jaén • Spain
2005 - 2011	PhD Student • Universidad Carlos III de Madrid • Spain

A.3. Education

PhD, Licensed, Graduate	University	Year
PhD in Mathematical Engineering	Universidad Carlos III de Madrid (Spain)	2010
MSc in Applied Physics	Technische Universiteit Eindhoven (the Netherlands)	2005

Part B. CV SUMMARY

Bio

Wilfried Coenen is Professor of Fluid Mechanics (2020) at the Universidad Carlos III de Madrid (UC3M). From 2015 to 2019, he worked 4 years as a postdoctoral scholar at the University of California San Diego (USA), where he developed part of his professional career by the side of professors Forman Williams, Antonio L. Sánchez and Juan C. Lasheras. Earlier, he worked at UC3M (2011-2015) as a lecturer, and at the Universidad de Jaén (2010-2011) as a researcher. His PhD thesis (2010), directed by Alejandro Sevilla, was carried out at UC3M. During his doctorate, he did short research stays at the University of East-Anglia in Norwich (UK), University of Hawai'i at Manoa



(USA), San Diego State University (USA), and University of California San Diego (USA). He owns a Master of Science degree in Applied Physics from the Technische Universiteit Eindhoven (2005).

Research interests

W. Coenen has made contributions in two main fields of research. On one hand, he has focused on the hydrodynamic stability of jets and buoyant reactive flows, applying analytical and computational techniques to characterize the different instability mechanisms prevalent in these flows. As an example of application, he has explained and quantified the typical flickering and puffing dynamics of a diffusion flame as a self-sustained oscillation resulting from a global instability of the flow. On the other hand, more recently he has been interested in biomedical flows in the human central nervous system, in particular the flow of cerebrospinal fluid in the spinal canal and cerebral ventricular system. Here, the main goal is to combine mathematical models with patient-specific MRI measurements to give individualized quantitative flow predictions. This approach can be used to optimize intrathecal drug delivery protocols, or to study certain disorders in which cerebrospinal fluid flow plays an important role, such as normal pressure hydrocephalus or syringomyelia.

Funding & publications

W. Coenen is currently (2021-2024) leading a national R&D&I grant funded by the Spanish Ministry of Science and Innovation, coordinated with two other universities. Recently (2020-2021), he was PI of a regional grant funded by the Comunidad de Madrid. He is also PI of a contract with the company Neurostech for the development of a medical device. He has published 32 articles in leading journals of his field of research (of which 24 in Q1), and has numerous contributions at international conferences (approx. 4 per year). He has directed 2 PhD theses, and is currently co-directing a 3rd phd student, to be finished in 2024. He has two accredited research sexennia.

Part C. RELEVANT MERITS

C.1. Publications (from last 5 years, 2019-2023)

- F. Moral-Pulido, J.I. Jiménez-González, C. Gutiérrez-Montes, W. Coenen, A.L. Sánchez & C. Martínez-Bazán. In vitro characterization of solute transport in the spinal canal.
Physics of Fluids 35 051905 (2023)
IF 4.98 – Q1 (Physics, Fluids & Plasmas) <https://doi.org/10.1063/5.0150158>
- J. Alaminos-Quesada, J.J. Lawrence, W. Coenen & A.L. Sánchez. Oscillating viscous flow past a streamwise linear array of circular cylinders.
Journal of Fluid Mechanics 959 A39 (2023)
IF 4.25 – Q1 (Physics, Fluids & Plasmas) <https://doi.org/10.1017/jfm.2023.178>
- C. Gutiérrez-Montes, W. Coenen, M. Vidorreta, S. Sincomb, C. Martínez-Bazán, A.L. Sánchez & V. Houghton. Effect of Normal Breathing on the Movement of CSF in the Spinal Subarachnoid Space.
American Journal of Neuroradiology 44 (9) 1369-1374 (2022)
IF 4.97 – Q2 (Radiology, Nuclear Medicine & Medical Imaging) <https://doi.org/10.3174/ajnr.A7246>
- J. Alaminos-Quesada, W. Coenen, C. Gutierrez-Montes, & A.L. Sánchez. Buoyancy-modulated Lagrangian drift in wavy-walled vertical channels as a model problem to understand drug dispersion in the spinal canal.
Journal of Fluid Mechanics 949 A48 (2022)
IF 4.25 – Q1 (Physics, Fluids & Plasmas) <https://doi.org/10.1017/jfm.2022.799>

- S. Sincomb, W. Coenen, C. Gutierrez-Montes, C. Martínez-Bazán, V. Haughton & A.L. Sánchez. A one-dimensional model for the pulsating flow of cerebrospinal fluid in the spinal canal.
Journal of Fluid Mechanics 939 A26 (2022)
IF 4.25 – Q1 (Physics, Fluids & Plasmas) <https://doi.org/10.1017/jfm.2022.215>
- S. Ramanarayanan, W. Coenen, & A.L. Sánchez. Viscoacoustic. Squeeze-film force on a rigid disk undergoing small axial oscillations.
Journal of Fluid Mechanics 933 A15 (2022)
IF 4.25 – Q1 (Physics, Fluids & Plasmas) <https://doi.org/10.1017/jfm.2021.1072>
- S. Sincomb, W. Coenen, E. Criado-Hidalgo, K. Wei, K. King, M. Borzage, V. Haughton, A.L. Sánchez & J.C. Lasheras. Transmantle Pressure Computed from MR Imaging Measurements of Aqueduct Flow and Dimensions.
American Journal of Neuroradiology 42 (10) 1815-1821 (2021)
IF 4.97 – Q2 (Radiology, Nuclear Medicine & Medical Imaging) <https://doi.org/10.3174/ajnr.A7246>
- W. Coenen, X. Zhang & A.L. Sánchez. Lubrication analysis of peristaltic motion in non-axisymmetric annular tubes.
Journal of Fluid Mechanics 921 R2 (2021)
IF 4.25 – Q1 (Physics, Fluids & Plasmas) <https://doi.org/10.1017/jfm.2021.525>
- W. Coenen, A.L. Sánchez, R. Felez, K. Davis & G. Pawlak. Residual streaming flows in buoyancy-driven cross-shore exchange.
Journal of Fluid Mechanics 920 A1 (2021)
IF 4.25 – Q1 (Physics, Fluids & Plasmas) <https://doi.org/10.1017/jfm.2021.293>
- C. Gutiérrez-Montes, W. Coenen, J.J. Lawrence, C. Martínez-Bazán, A.L. Sánchez & J.C. Lasheras. Modelling and direct numerical simulation of flow and solute dispersion in the spinal subarachnoid space.
Applied Mathematical Modelling 94 516-533 (2021)
IF 5.33 – Q1 (Mechanics) <https://doi.org/10.1016/j.apm.2021.01.037>
- J. Carpio, W. Coenen, A.L. Sánchez, E. Oran, F.A. Williams. Numerical description of axisymmetric blue whirls over liquid-fuel pools.
Proceedings of the Combustion Institute 38(2) 2041-2048 (2021)
IF: 6.72 – Q1 (Engineering, Mechanical) <https://doi.org/10.1016/j.proci.2020.06.327>
- R.S.P. Hakes, W. Coenen, A.L. Sánchez, M.J. Gollner & F.A. Williams. Stability of laminar flames on upper and lower inclined fuel surfaces.
Proceedings of the Combustion Institute 38(3) 4515-4523 (2021)
IF: 6.72 – Q1 (Engineering, Mechanical) <https://doi.org/10.1016/j.proci.2020.06.302>
- S. Sincomb, W. Coenen, A.L. Sánchez, J.C. Lasheras. A model for the oscillatory flow in the cerebral aqueduct.
Journal of Fluid Mechanics 899 R1 1-12 (2020)
IF: 3.63 – Q1 (Physics, Fluids & Plasmas) <https://doi.org/10.1017/jfm.2020.463>
- Weiss, P. Rajamanickam, W. Coenen, A.L. Sánchez, F.A. Williams. A model for the constant-density boundary layer surrounding fire whirls.
Journal of Fluid Mechanics 900 A22 1-23 (2020)
IF: 3.63 – Q1 (Physics, Fluids & Plasmas) <https://doi.org/10.1017/jfm.2020.513>
- W. Coenen, C. Gutiérrez-Montes, S. Sincomb, E. Criado-Hidalgo, C. Martínez-Bazán, K. King, V. Haughton, A.L. Sánchez, J.C. Lasheras. Subject-specific evaluation of CSF bulk flow in the spinal canal: recirculating flow patterns and implications for ITDD drug dispersion.
American Journal of Neuroradiology 40 (7) 1242-1249 (2019)
IF: 3.38 – Q1 (Radiology, Nuclear Medicine & Medical Imaging) <https://doi.org/10.3174/ajnr.A6097>
- W. Coenen, E.J. Kolb, A.L. Sánchez, F.A. Williams. Observed dependence of characteristics of liquid-pool fires on swirl magnitude.



Combustion and Flame 205 1-6 (2019)

IF: 4.57 – Q1 (Engineering, Mechanical) <https://doi.org/10.1016/j.combustflame.2019.03.032>

- J.I. Jiménez-González, C. Manglano-Villamarín & W. Coenen. The role of geometry on the global instability of wakes behind streamwise rotating axisymmetric bodies.
European Journal of Mechanics B/Fluids 76 205-222 (2019)
IF: 2.13 – Q2 (Mechanics) <https://doi.org/10.1016/j.euromechflu.2019.03.003>
- W. Coenen, P. Rajamanickam, A.D. Weiss, A.L. Sánchez & F.A. Williams. Swirling flow induced by jets and plumes.
Acta Mechanica 230 2221-2231 (2019)
IF: 2.10 – Q3 (Mechanics) <https://doi.org/10.1007/s00707-019-02382-2>
- J.J. Lawrence, W. Coenen, A.L. Sánchez, G. Pawlak, C. Martínez-Bazán, V. Haughton, J.C. Lasheras. On the dispersion of a drug delivered intrathecally in the spinal canal.
Journal of Fluid Mechanics 861, 679-720 (2019).
IF: 3.35 – Q1 (Mechanics) <https://doi.org/10.1017/jfm.2018.937>
- P. Rajamanickam, W. Coenen, A.L. Sánchez & F.A. Williams. Influences of stoichiometry on steadily propagating triple flames in counterflows.
Proceedings of the Combustion Institute 37(2) 1971-1977 (2019)
IF: 5.63 – Q1 (Engineering, Mechanical) <https://doi.org/10.1016/j.proci.2018.05.044>
- D. Moreno-Boza, W. Coenen, J. Carpio, A.L. Sánchez & F.A. Williams. On the critical conditions for pool-fire puffing.
Combustion and Flame 192 426-438 (2018)
IF: 4.12 – Q1 (Engineering, Mechanical) <https://doi.org/10.1016/j.combustflame.2018.02.011>
- Weiss, W. Coenen, A.L. Sánchez & F.A. Williams. The acoustic response of Burke-Schumann counterflow flames.
Combustion and Flame 192 25-34 (2018)
IF: 4.12 – Q1 (Engineering, Mechanical) <https://doi.org/10.1016/j.combustflame.2018.01.039>

C.2. Research projects (from last 5 years, 2019-2023)

As principal investigator

- *Modeling the cerebrospinal fluid flow in the spinal canal and its implications in neurological disorders*
PI: W. Coenen, M. Rubio-Rubio • 09/2021 – 08/2024 • Ref: PID2020-115961RA-C33 • € 102.850
Universidad Carlos III de Madrid • **Agencia Estatal de Investigación (“Proyectos I+D+i Retos Investigación”)**
- *Cerebrospinal fluid flow and its role in the pathogenesis of syringomyelia*
PI: W. Coenen • 01/2020 – 12/2021 • Ref.: CSFFLOW-UC3M • € 58.140
Universidad Carlos III de Madrid • **Comunidad de Madrid - UC3M**

As collaborating researcher

- *Development of patient-specific mathematical models for the transport of solute molecules in the cerebrospinal fluid along the spinal canal*
PI: J.C. Lasheras, A.L. Sánchez • 09/2020 – 08/2025 • Ref.: 1-R01-NS120343-01 • \$ 3.120.197
University of California San Diego • **National Institute for Health (USA)**
- *Flow and transport in the spinal canal*
PI: A.L. Sánchez • 07/2019 – 06/2022 • Ref.: 1916979 • \$ 300.892
University of California San Diego • **National Science Foundation (USA)**
- *Swirling dynamics in liquid-pool fires*



PI: A.L. Sánchez • 07/2019 – 06/2022 • Ref.: 1853954 • \$ 325.100

University of California San Diego • **National Science Foundation (USA)**

- *Analysis and scaling of high-speed and turbulent combustion for gaseous and liquid fuels*
PI: F.A. Williams, A.L. Sánchez • 09/2016 – 08/2019 • Ref.: A9550-16-1-0443 • \$ 650.000
University of California San Diego • **Air Force Office of Scientific Research (USA)**

C.3. Contracts, technological or transfer merits

- *Characterization and optimization of the Neurostech pseudoliberation device*
PI: W. Coenen • 12/2022 (7 months) • € 29766
Neurostech S.L.
- *Experimental characterization of jet fuel atomization*
PI: W. Coenen, J. Rodríguez-Rodríguez • 11/2012 (2 months) • € 10124
Repsol S.A.
- *Computational Fluid Mechanics and Turbulence Modeling*
PI: W. Coenen, O. Flores, M. García-Villalba • 06/2012 (1 week) • € 5500
Acciona Windpower S.A.

C.4. Research stays abroad

- **University of California at San Diego (USA)** • postdoctoral researcher • 3 years and 10 months
• nov 2015 - aug 2019 • mentors: J.C. Lasheras, F.A. Williams, A.L. Sánchez
- **San Diego State University (USA)** • predoctoral stay • 2.5 months • summer 2010 • mentor: G. Jacobs
- **University of Hawai'i at Manoa (USA)** • predoctoral stay • 2 months • autumn 2009 • mentor: E. Pawlak
- **University of East-Anglia (UK)** predoctoral stay • 3 months • spring 2008 • mentor: N. Riley
- **University of California at San Diego (USA)** predoctoral stay • 2.5 months • summer 2007 • mentor: F.A. Williams

C.5. Supervised doctoral theses

- *Theoretical and numerical modeling of fluid-structure-interaction problems associated with cerebrospinal fluid flow in the spinal canal*, Antonio José Luque Bárcenas (co-directing with C. Martínez-Bazán), to present in 2024
- *Stability and receptivity of variable density flows: the low-density jet and the Clarke-Riley boundary layer*, Daniel Gómez-Lendínez (codirected by A. Sevilla), 2018
- *Break-up of liquid jets stretched by gravity*, Paula Consoli-Lizzi (codirected by A. Sevilla), 2016

C.6. Other merits

- Associate Pro Vice-Chancellor of International Affairs
("Adjunto al Vicerrector de Internacionalización")
Universidad Carlos III de Madrid, 2023-now
- Secretary of the Department of Thermal and Fluid Engineering
Universidad Carlos III de Madrid, 2022-now
- Member of the evaluating committee
Agencia Estatal de Investigación (Spain), 2019 & 2023
- Member of the project evaluation team
DEVA, Agencia Andaluza del Conocimiento (Spain) 2020 - now



- Reviewer for Journal of Fluid Mechanics, Scientific Reports (Nature), Physics of Fluids, European Journal of Mechanics B/Fluids, Applied Mathematical Modelling, Theoretical and Computational Fluid Dynamics.
- Outstanding PhD Thesis award, UC3M, 2010