

PROFESSOR JUAN CARLOS LASHERAS

16 August 1951 – 1 February 2021



Image of Juan Lasheras, reproduced with permission from University of California San Diego Jacobs School of Engineering.

Juan Carlos Lasheras, Professor at the University of California, San Diego (UCSD) and Associate Editor of *Journal of Fluid Mechanics* (2012–present), passed away after a brief illness on 1 February 2021. Juan was born in Valencia, Spain. He joined Universidad Politecnica de Madrid at the age of 18, graduating with a BS/MS degree from the School of Aeronautics in 1975. After a short period of military service in the Air Force, he commenced graduate study at Princeton University in 1977 under a Guggenheim fellowship. His dissertation research, conducted under the guidance of Professor Irv Glassman, was on the combustion of fuel droplets. After graduating in 1981 from Princeton with a PhD in Aerospace Engineering, he joined the Koninklijke/Shell Laboratorium in Amsterdam to lead their combustion group. The pull of fundamental research brought him back in 1983 to the USA as a faculty member at the University of Southern California (USC). He was recruited in 1990 by the University of California at San Diego (UCSD), where he joined the faculty of the department of Applied Mechanics and Engineering Sciences (AMES), now Mechanical and Aerospace Engineering (MAE). His professional home for the next 31 years would be MAE and UCSD, where his multiple lines of research flourished, he advanced through the academic ranks to become the Stanford and Beverly Penner Professor of Engineering or Applied Sciences, he served as MAE Chair (1999–2004), and was appointed Interim Dean, Jacobs School of Engineering (2012–2013).

Juan's early work was in shear flow instabilities, where he obtained some of the early evidence for counter-rotating streamwise vortices in a plane shear layer as a mechanism for three-dimensionalization of the flow and for the three-dimensional vortex dynamics

of wakes and jets. This early work was followed by a period of vigorous research into multiphase turbulent flows, which commenced in the mid-1990s. Juan led several studies that provided new insights by providing direct experimental quantification of the complex processes underlying problems with multiphase turbulence and by proposing their models. Examples with noteworthy community impact are bubble breakup by turbulence, the effect of particle clustering on particle settling velocity and liquid jet breakup.

In the early 2000s, Juan developed an interest in biological and medical systems, a direction which would eventually propel much of his subsequent research. Juan drew extensively on the principles of fluid mechanics, soft-matter physics and biomechanics to conduct his work. He was a strong proponent of the value added by interdisciplinary research. His own work leveraged collaborations with experts in medicine, biology and bioengineering. Diverse applications of his biomedical research include drug delivery, arterial aneurysms, the mechanics of cell motility, endothelial cell remodelling, and more recently leukocyte migration across blood vessel walls and cerebrospinal fluid (CSF) motion. His group developed a new method for the precise measurement of three-dimensional traction forces which was essential to develop mechanistic models of the phenomenon of chemotactic motility of amoeboid cells. His collaborative work in CSF dynamics is a beautiful example of the merger of classical fluid dynamical asymptotics (published in *JFM*), *in vitro* experiments and *in vivo* patient-specific radiological measurements to further the basic understanding of the transport of solute molecules and ultimately intrathecal and intraspinal drug delivery. Juan's basic research in biomechanics has been accompanied by a long-standing interest in medical devices. He holds several patents related to techniques which induce localized therapeutic hypothermia for the treatment of diverse medical conditions.

Juan has received many honours which include election to the National Academy of Engineering and Fellow of the American Physical Society. He generously credited his students and postdocs in large part for the research outcomes which have led to his many academic honours. He was a master teacher, receiving four Best Teacher Awards in the department and one in the Jacobs School of Engineering. He was also a superb mentor with several of his mentees enjoying success as faculty and as researchers in national laboratories. Juan was dedicated to his profession with service to the American Physical Society/Division of Fluid Dynamics (APS/DFD) as the Chair (2001) and co-Chair (2013) of the Annual Meeting organizing committee and leadership as the Chair (2010) of the APS/DFD.

In addition to his superlative accomplishments as a researcher and educator, Juan was a down-to-earth person, ever ready with a warm greeting to his colleagues. He led a balanced life enjoying weekend golf, long off-campus walks with his beloved wife of many years, Alexis, and on-campus walks with his colleagues partly to offset the effects of *pan y queso* (in his words) that he loved. He was much loved by his departmental colleagues for his friendship and generous support and much respected for his vision and leadership. While we in the fluid mechanics community have lost one of our stalwarts, we celebrate the example that he has set for us.

Juan is survived by Alexis, his wife of more than 35 years, his siblings, Maruja, Arsenio and Teresa, and his nephews and nieces, Javier, Carmen, Jose Maria, Arsenio, Luz, Jaime and Robbie.

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