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Foluso Ladeinde,[1,a)] Peyman Givi,[2] and Cesar Dopazo[3]

AFFILIATIONS

[1]Department of Mechanical Engineering, 113 Light Engineering Building, Stony Brook University, Stony Brook, New York 11794-2300, USA
[2]Department of Mechanical Engineering, 648 Benedum Hall, University of Pittsburgh, Pittsburgh, Pennsylvania 15261, USA
[3]Department of Science and Technology of Materials and Fluids, School of Engineering and Architecture, University of Zaragoza, Maria de Luna 3, Zaragoza 50018, Spain

Note: This paper is part of the special topic, In Memory of Edward E. (Ted) O'Brien.
[a)]**Author to whom correspondence should be addressed:** Foluso.Ladeinde@Stonybrook.edu

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This Special Issue of *Physics of Fluids* (PoF) is devoted to the memory of Edward E. ("Ted") O'Brien, our friend, colleague, and mentor, in recognition of his seminal contributions to turbulence theory and modeling. Ted, Late Professor Emeritus of The Department of Mechanical Engineering at the State University of New York, Stony Brook, Long Island, passed away in February of 2019. Colleagues at the Division of Fluid Dynamics (DFD) of The American Physical Society (APS) decided to celebrate Ted's life at the 72nd APS-DFD Meeting in Seattle, November 2019. Two sessions of the Meeting were devoted to Ted, including 18 presentations by researchers from all over the world. At the conclusion of these sessions, the community felt we must celebrate Ted in PoF, where he published most of his work. All of the papers in this Special Issue are by invitation of the Guest Editors but processed independently by PoF.

Ted was born on 16 May 1933 in the rural town of Toowoomba in Queensland, Australia, to Thomas Patrick and Ellen O'Brien. Ted was a twin (Fig. 1). His twin brother, Anthony O'Brien, who served as a missionary in Papua New Guinea, passed away a couple of years before him. He and his brothers were educated at a Catholic boarding school for boys. Ted studied at the University of Queensland in Brisbane where he majored in Mechanical Engineering and obtained his Bachelor's degree in 1955. He then moved to the United States, attending Purdue University to obtain his Master's degree in 1957. With a Fulbright Fellowship, Ted attended the Johns Hopkins University where he received his Ph.D. in Mechanical Engineering in 1960, followed by a year's post-doctoral position at the same institution. In 1961, Ted joined the inaugural faculty at the State University of New York at Stony Brook as a founding professor in the College of Engineering and Applied Science. Under his leadership, as a member of the Department of Thermal Sciences, the program gained

FIG. 1. Ted (right) and his twin brother, Anthony O'Brien.

FIG. 2. Ted and his wife, Estella.

popularity and developed into the Department of Mechanics, later becoming the Department of Mechanical Engineering, where he served as the Chair from 1983 to 1991.

Ted met his wife Estela (nee Marquetti) in 1958 while studying at Johns Hopkins, and they were married in Washington DC in December 1959, as interracial marriage was illegal in Maryland at the time. Ted and Estela (Fig. 2) moved to Saint James, Long Island, to raise their six children: Maria, Cecilia, Anthony, Estela, Soledad, and Edward Orestes (Fig. 3). Ted and Estela had 21 grandchildren at the time of his passing.

By way of extracurricular activities, Ted was an avid tennis player, sailor, and swimmer. He also loved riding his motorcycle (Fig. 4) and volunteered at his local Catholic parish, Saints Phillip and James Church.

Ted studied under Stanley Corrsin, one of the creative architects of turbulence and reacting flows at Johns Hopkins. Ted's contributions

FIG. 3. Ted, his wife, and six children, standing from left to right, Anthony, Maria, Estella, Cecilia, Soledad, and Orestes.

FIG. 4. Ted on a motorcycle.

are diverse and span a broad range of approaches in turbulence. In the 1960s, he made some very fundamental contributions to the spectral theory of reactive scalars, analyzed the consequences of passive scalar tagging using Corrsin's "backward Lagrangian diffusion" concept, and contributed to the interpretation of Kraichnan's "direct interaction approximation" (DIA) for turbulent mixing. As his graduate student, one of us (C.D.) can attest to his sense of humor when he handed out a ten-page handwritten document entitled "A child's guide to Kraichnan's DIA" as a part of one of his courses. In the 1970s–1980s, he focused on scalar Probability Density Functional and Function methods. In fact, he is widely recognized for introducing and popularizing single- and multi-point PDF closures, as well as the scalar-gradient PDFs within the reactive turbulent flow community. In the 1990s, he focused on applying the EDQNM spectral closure and the "amplitude mapping closure" (AMC) of scalar mixing. Near the end of his research career, he made some highly cited contributions to DNS and LES, including the incorporation of PDF into LES.

The pioneering work of Ted was the result of a unique combination of a powerful physical intuition and a mastery of advanced mathematical tools. Fundamental scientific discovery was of utmost importance to him. He always thought that a detailed understanding of the physics of every problem must necessarily precede "closure hypotheses" or models and, obviously, the computation of complicated systems of industrial relevance. Transported PDF methods became a subject of interest to companies in the late eighties and early nineties, confirming Spalding's perception that innovative ideas have a lead time from 20 to 30 years. Ted was never pressed to produce marketable or commercial codes and always thought that excellent research eventually impacts on science and ultimately on society. It has been said by many that Ted should be counted as one of the most influential persons in the world since the 1960s in the field of turbulent reacting flows. The legacy of Ted's research on the scientific community will have reverberations around the world, the full magnitude of which are yet unknown.