

## Dr. Mohamed Gad-el-Hak Biographical Sketch

**Mohamed Gad-el-Hak** received his B.Sc. (summa cum laude) in mechanical engineering from Ain Shams University in 1966 and his Ph.D. in fluid mechanics from The Johns Hopkins University in 1973, where he worked with Professor Stanley Corrsin. (Corrsin's graduate advisors at Caltech were Hans W. Liepmann and Theodore von Kármán. The latter's doctoral advisor at Göttingen was Ludwig Prandtl.) Gad-el-Hak has since taught and conducted research at the University of Southern California, University of Virginia, University of Notre Dame, Institut National Polytechnique de Grenoble, Université de Poitiers, Friedrich-Alexander-Universität Erlangen-Nürnberg, Technische Universität München, Technische Universität Berlin, Brandenburgische Technische Universität Cottbus, and Université de Valenciennes, and has lectured extensively at seminars in the United States and overseas. Dr. Gad-el-Hak is currently the Inez Caudill Eminent Professor of biomedical engineering and professor of mechanical & nuclear engineering at Virginia Commonwealth University in Richmond. From 2002 to 2009, Gad-el-Hak was the chair of mechanical engineering at VCU. Prior to his Notre Dame appointment as professor of aerospace and mechanical engineering, Gad-el-Hak was senior research scientist and program manager at Flow Research Company in Seattle, Washington, where he managed a variety of aerodynamic and hydrodynamic research projects. Gad-el-Hak wrote extensively for the popular press on issues relevant to education and research.

Professor Gad-el-Hak is world renowned for advancing several novel diagnostic tools for turbulent flows, including the laser-induced fluorescence technique for flow visualization; for discovering the efficient mechanism via which a turbulent region rapidly grows by destabilizing a surrounding laminar flow; for conducting the seminal experiments that detailed the fluid-compliant surface interactions in turbulent boundary layers; for introducing the concept of targeted control to achieve drag reduction, lift enhancement, noise suppression, and mixing augmentation in wall-bounded flows; and for developing a novel viscous pump suited for microelectromechanical systems (MEMS) applications. Gad-el-Hak's work on Reynolds number effects in turbulent boundary layers, published in 1994, marked a significant paradigm shift in the subject. His 1999 paper on the fluid mechanics of microdevices established the fledgling field on firm physical grounds and, at 1,626 citations, is one of the most cited articles of the 1990s. Gad-el-Hak's recent work on large-scale disasters resulted in the establishment of a universal metric by which the severity of *all* natural and manmade disasters is measured.

Gad-el-Hak holds two patents: one for a drag-reducing method for airplanes and underwater vehicles, and the other for a lift control device for delta wings. Dr. Gad-el-Hak has published over 645 articles, authored/edited 20 books and conference proceedings, and presented over 313 invited lectures in the basic and applied research areas of isotropic turbulence, boundary layer flows, stratified flows, fluid-structure interactions, compliant coatings, unsteady aerodynamics, biological flows, non-Newtonian fluids, hard and soft computing including genetic algorithms, reactive flow control, and microelectromechanical systems. Gad-el-Hak's papers have been cited (as of July 2021) more than 16,315 times in the technical literature, and his h-index is 58, i10-index is 147, and i100-index is 32. Two of Gad-el-Hak's books have been translated into Chinese, and several of his articles/essays have been translated into Arabic, Chinese, the Czech language, French, German, Japanese, Russian, Spanish, and Turkish. Gad-el-Hak is the author of the book *Flow Control: Passive, Active, and Reactive Flow Management*, and editor of the books *Frontiers in Experimental Fluid Mechanics*, *Advances in Fluid Mechanics Measurements*, *Flow Control: Fundamentals and Practices*, *The MEMS Handbook* (first and second editions), *Transition and Turbulence Control*, and *Large-Scale Disasters: Prediction, Control and Mitigation*.

Professor Gad-el-Hak is a fellow of the American Academy of Mechanics, American Association for the Advancement of Science, American Institute of Physics, American Physical Society, and American Society of Mechanical Engineers. He has recently been inducted as an eminent engineer in Tau Beta Pi, an honorary member in Sigma Gamma Tau and Pi Tau Sigma, and a member-at-large in Sigma Xi. Dr. Gad-el-Hak served as associate editor of *Applied Mechanics Reviews* (1988–2012) and *AIAA Journal* (1988–1991). He is currently serving as editor-in-chief of *e-MicroNano.com*; associate editor of *e-Fluids*; editorial advisor to *Bulletin of the Polish Academy of Sciences*, *International Journal of Flow Control*, *CFD Letters*, and *International Journal of Aerospace Engineering*; and contributing editor to Springer-Verlag's *Lecture Notes in Engineering* and *Lecture Notes in Physics*, McGraw-Hill's *Year Book of Science & Technology*, and *Encyclopedia of Science & Technology*, and CRC Press's *Mechanical Engineering Series*.

Dr. Gad-el-Hak served as a member of the Executive Committee of the Faculty Senate at the University of

Notre Dame, member of the University Committee on Patents, chair of the Benefits Committee, and chair of the University Governance Committee. He serves as consultant to the governments of Algeria, Brazil, China, Egypt, France, Germany, India, Italy, Poland, Singapore, Sweden, and the United States; the United Nations; and numerous industrial and academic organizations. Professor Gad-el-Hak has been a member of several advisory panels for the U.S. Department of Defense, the U.S. Department of Energy, the National Aeronautics and Space Administration, and the National Science Foundation.

During the 1991/1992 academic year, he was a visiting professor at Institut de Mécanique de Grenoble, France. During the summers of 1993, 1994, and 1997, Dr. Gad-el-Hak was, respectively, a distinguished faculty fellow at Naval Undersea Warfare Center, Newport, Rhode Island; a visiting exceptional professor at Université de Poitiers, France; and a Gastwissenschaftler (guest scientist) at Forschungszentrum Rossendorf, Dresden, Germany. In 1998, Professor Gad-el-Hak was named the Fourteenth ASME Freeman Scholar. In 1999, Gad-el-Hak was awarded the prestigious Alexander von Humboldt Prize—Germany’s highest research award for worldwide scientists and scholars in all disciplines—as well as the Japanese Government Research Award for Foreign Scholars. In 2002, Gad-el-Hak was named ASME Distinguished Lecturer, as well as inducted into The Johns Hopkins University Society of Scholars. In 2016, he was awarded the ASME Medal for seminal contributions to the discipline of fluids engineering. In the same year, Gad-el-Hak also received an ASME certificate of appreciation in testimony of the high regard of his associates and the deep appreciation of the society for his valued services in advancing the engineering profession.

To honor Professor Gad-el-Hak, six academicians from three countries penned the editorial “Homage to a Legendary Dynamicist on His Seventy-Fifth Birthday”. The article appeared in the July 2020 issue of the *Journal of Fluids Engineering*. <https://www.people.vcu.edu/~gadelhak/Homage.pdf>

## Related URLs

**Home Page:** <https://www.people.vcu.edu/~gadelhak/>

**Wikipedia:** [https://en.wikipedia.org/wiki/Mohamed\\_Gad-el-Hak](https://en.wikipedia.org/wiki/Mohamed_Gad-el-Hak)

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