





This Graduate Fellowship is named in memory of Stanley Corrsin, a distinguished former Johns Hopkins professor who made groundbreaking contributions to fluid mechanics and shaped a unique legacy of scholars, former students, postdocs, and collaborators. Their lasting admiration and appreciation has led to the establishment of the Corrsin Graduate Fellowship in Fluid Dynamics.



Stanley Corrsin

Born in 1920 in Philadelphia, Professor Stanley Corrsin completed his undergraduate work at the University of Pennsylvania and received his Ph.D. in aeronautics at the California Institute of Technology. In 1947 he retured to the East Coast and joined the nascent Johns Hopkins aeronautics department. At various times over the years he was affiliated with the Departments of Mechanics, Mechanical Engineering, Materials Science, Biomedical Engineering, and Chemical Engineering. Between 1955 and 1960 he served as department chair of mechanical engineering and in 1979, during the establishment of the Whiting School he helped found the Department of Chemical Engineering. In 1981, he was appointed to the Theophilus Halley Smoot Chair of Engineering at Johns Hopkins. He died in 1986. Professor Corrsin earned many distinctions and awards, reflecting the impact of his contributions and the esteem in which he was held as a scholar. Among others he was a member of the US National Academy of Engineering, received the Fluid Dynamics Prize of the American Physical Society, which now also awards the vearly Corrsin Award, and he was named Docteur Honoris Causa of the University of Lyon. It is said that while he received many honors he always preferred the title "Professor of Fluid Mechanics." At Hopkins, Corrsin is further remembered with the Memorial Lecture in Fluid Mechanics in the Department of Chemical and Biomolecular Engineering, the Corrsin-Kovasznay Best Paper Award in the Center of Environmental and Applied Fluid Mechanics, and now, the Corrsin Graduate Fellowship in Fluid Dynamics in the Whiting School of Engineering.





Professor Stan Corrsin explaining decaying isotropic turbulence behind a grid in a wind tunnel, including a secondary contraction, to promote equality among the longitudinal and the lateral fluctuation intensities.



Scientific contributions

Corrsin developed the statistical theory of scalars such as temperature or concentration fields being transported in turbulence. He proposed the -5/3 scaling power-law for the passive scalar fluctuation spectrum, now called the Obukhov–Corrsin spectrum, named after him and Obukhov who arrived at the same result independently. The Corrsin scale characterizes the transition from convective to diffusive behavior for low Prandtl number fluids such as liquid metals.

With his students and collaborators, Corrsin laid the groundwork for many areas in fluid mechanics and turbulence. For instance, he critically examined the average rate of transport of particle concentration under a given mean concentration gradient, leading to better understanding of mixing and eddy diffusion, and studied geometric aspects such as the average rate of increase of the length of a fluid line or of the area of a fluid surface. Corrsin performed the first systematic observations of outer intermittency in turbulent shear flows. Such intermittency occurs at locations in which the flow can be either turbulent or non-turbulent at different instants in time. Corrsin's insight, based upon his 1943 doctoral experiments on axisymmetric jets, led to the seminal identification of the viscous superlayer, the thin outermost region of a turbulent flow that is bounded by a free stream or quiescent fluid.

Measurements of decaying isotropic turbulence behind a grid in the Corrsin wind tunnel and in homogeneous sheared turbulence are still being used today as baseline tests for new models and large eddy simulations. Corrsin was the first to apply statistical theory to turbulent reacting flows, laying the groundwork of what is today the vast research area of turbulent combustion. In his later years Corrsin made early contributions to important topics in medical and biological fluid mechanics such as maternal blood flow in the placenta, the motion of the precorneal fluid film of the eye, and the aerodynamics of bird flight. In addition to his towering scientific contributions, Stanley Corrsin is fondly remembered by his many disciples for being a mentor of deep humanity and kindness. As noted by Dr. Mohamed Gad-el-Hak. his students and mentees "all learned the evil of all facets of preiudice and the virtue of tolerance. **Corrsin never preached** or forced his views on anyone, but his message was loud and clear albeit ever subtle."

Stanley Corrsin is also remembered by his many friends and students as a man with a keen and sophisticated sense of humor. As noted by Dr. Stephen Davis in the 2003 Annual Review of Fluid Mechanics piece on Stanley Corrsin: "One cannot 'explain' Stan without appreciating his sense of humor. On one occasion he placed a contact lens on the eye of a potato, photographed it, and sent it to his grant monitor at the National Science Foundation." Dr. John Foss recalls that after colon surgery Corrsin announced "I used to have a colon, now I have a semicolon". As remarked by Dr. James Riley, Corrsin often came up with one-liners which, at first, seemed just humorous, and sometimes startling, but often made one later stop and think. "I like to do research that is not relevant" is one such example. He learned early on that focusing too much on the present, most relevant problem can be severely limiting to a student, who then isn't prepared for new, different problems that will inevitably arise in the future.





Corrsin loved baseball and relished explaining the fluid dynamics of knuckle balls. Corrsin is also admired for having known precisely where to find any paper or document in his office, in which according to documented evidence (see photo above) an unconventional filing system prevailed. It motivated a cartoon that appeared in materials for a memorial held in his honor in 1986, and is adapted on the right.





The Corrsin Graduate Fellowship in Fluid Dynamics is endowed thanks to the generous contributions from the following former students, friends, colleagues, and scholarly collaborators

Dr. Ralph Budwig Dr. Stephen Davis Dr. John Foss Dr. Mohamed Gad-el-Hak Dr. Vascar Harris Dr. Fazle Hussain Dr. Michael Karweit Dr. Charles Petty Dr. James J. Riley Dr. Katepalli R. Sreenivasan Dr. Stan Wilson

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Special thanks to Dr. John Foss for his championship of the creation of this fund



For listings of the Corrsin Fellows and additional information and yearly updates, see https://pages.jh.edu/ceafm/.



Remembering Stanley Corrsin and "Stan's Hopkins"

Mohamed Gad-el-Hak, PhD Professor, Virginia Commonwealth University

In 1968, I arrived at the Johns Hopkins University on a hot summer day when the relative humidity in Baltimore was 100% and rising. In 1973, I left to the University of Southern California, again during another hot summer day. Despite the stifling humidity, the intervening five years were the happiest of my life mostly because of one man, the incomparable Stanley Corrsin. First, I attended Professor Corrsin's famed course on fluid mechanics, followed by serving as his TA in the same, and finally being honored as Stan's doctoral student. His everlasting smile, kindness, wit, humanity, and sharp intellect will always be with me. From him, I learned much about science, basic research, politics, decency, life, and of course fluid mechanics. Except for Sundays, the daily coffee hour offered the necessary education-outside the traditional classroomon everything from the fluid mechanics of coffee percolation to the Watergate fiasco. Most importantly, all of Stan's disciples learned the evil of all facets of prejudice and the virtue of tolerance. Dr. Corrsin never preached or forced his views on anyone, but his message was loud and clear albeit ever subtle. In short, there has never been and never will be another Stanley Corrsin, whose academic tree roots extend to Hans Liepmann, Theodore von Kármán, and Ludwig Prandtl. I feel privileged that I have known that great human.



Stan was a mentor, a friend, a great researcher, and a person with an unimpeachable ethic. What more could one want...?

Michael Karweit, diplome d'habilitation, PhD Research Professor, Johns Hopkins University

I was introduced to Stan as a potential graduate student. It was scheduled as a half-hour meeting, but lasted two hours. That was in 1965. Before that meeting was over, I was a new student in the Dept. of Mechanics with a graduate assistantship and a project to work on. I remained with him until his death in 1986, first as a student, then as a researcher.

Stan practiced fluid mechanics (and life) with skill, imagination, and humor. He told of his thesis advisor Hans Liepmann at Caltech originally thinking that Stan wasn't serious about his studies, because Stan was always light-hearted. Liepmann realized that he was wrong. Stan was always serious. He just tackled his studies in a different way. When Stan became a professor at JHU he sprinkled his memos, problem sets, and exams with hand-drawn cartoons. His exam problems were legendary. So many former students asked if they could have copies of them because they were so original. Stan had one mid-term exam: a take home, due in a week. Students cleared their calendars for that week to work on that exam. Some of his problems led to published papers. How big would a hole have to be in a wall for a smoke ring to propel itself through the hole? Only Stan would think of such a problem ...

Stan had a daily routine. Everyday at 10AM Stan took time for coffee. In a room big enough for twenty people he would invite his students, his co-workers (even from other departments) and visitors to attend. Out-oftown visitors knew where to find him. They didn't even bother with going first to his office. Discussions were always lively: some were scientific, some were political, some were sports-driven, and on Fridays some were about who would be shopping for a wine-and-cheese luncheon. (The timing of the weekly departmental seminar had to be rethought when occasionally an invited speaker consumed a little too much wine before his presentation.)



John Foss, PhD Professor, Michigan State University

It was my immense good fortune to spend my first sabbatical leave (1970-71) at the Johns Hopkins University and as a member of the research group of Stan Corrsin. As a grad student, I had studied the NACA Report by Corrsin and Kistler describing the viscous superlayer and I was (and still am) captivated by the insight and the physical/ mathematical reasoning that identified this thin region where vorticity is transferred from the fully turbulent region to the bounding free stream fluid. My respect-at-a-distance for that insight was greatly strengthened when I had the opportunity to experience Stan's guidance for his students (and me) in the weekly research meetings where the details of the several projects were discussed in depth. All aspects of that sabbatical experience were of profound importance to my 51 year career as a faculty member. The common motivation, of the contributors to this memorial to Stan's memory, is to permanently recognize the humanity and the caring for others by one who was so gifted.





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