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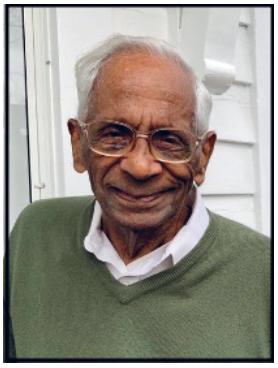
Obituary

Jagadish Chandran Kaimal

(Kuala Lumpur, Malaysia, 18 Nov. 1930 – New York, USA, 25 Jan. 2021)



Jagadish Chandran Kaimal passed away on 25 January 2021 at the age of 90. He was an atmospheric physicist whose work led to the fundamental understanding of turbulence processes in the atmospheric boundary layer.

Dr. Kaimal was born in Malaysia in 1930 and earned a bachelor's degree in Physics and Mathematics at Hindu University Banaras in India. After moving to the United States, he earned a doctorate in Meteorology and Electrical Engineering from the University of Washington in 1961. Under supervision and mentoring from Dr. Joost Businger, as part of his dissertation, he developed the first successful sonic anemometer-thermometer device capable of measuring high-frequency turbulence fluctuations. This device was further improved and became a key instrument for fundamental boundary-layer field programs focused on turbulence processes.

Starting in 1961, Dr. Kaimal was hired by the Air Force Cambridge Research Laboratory (AFCRL) in Bedford, Massachusets. Together with his colleagues, he was involved in the design and instrumentation of the field programs in Kansas and Minnesota. In 1975, he began his brilliant career at the National Oceanic and Atmospheric Administration (NOAA) as director of the newly established Boulder Atmospheric Observatory. His primary activities were the design, guidance, and management of large field programs focused on high-resolution probing of the atmospheric boundary layer using remote sensing and tall towers. In 1982 he became the head of the Atmospheric Studies Program at Wave Propagation Laboratory and directed a significant number of intercomparison experiments involving scientists from many5countries. Dr. Kaimal retired in 1992 and moved to Hamilton, New York.

Dr. Kaimal published over 70 journal articles in scientific journals. In one of his books, "Atmospheric Boundary Layer Flows: Their Structure and Measurement", he provides comprehensive research and future directions of the research focused on the atmospheric boundary layer and turbulence parameterizations.

One of his seminal papers was published in 1972 that investigates the behavior of the spectrum and co-spectrum of turbulence in the surface layer in terms of the similarity theory using wind and temperature fluctuation data from a field experiment in Kansas. Using the developed normalization, the spectra and co-spectra are reduced to a family of curves that follow the usual scaling laws at low frequencies but converge into a single universal curve in the inertial subrange. The results from this study are the basis for modeling the turbulence spectrum in the atmospheric boundary layer. The developed scaling of the spectrum and the co-spectrum has been extended in his subsequent studies to convective conditions which always present a challenge for numerical modeling. In his other studies, the turbulence parame-terizations have been modified for a stable atmospheric boundary layer, and also for atmospheric conditions over inhomogeneous terrain.

J. C. Kaimal also provided a significant engineering contribution by designing new types of sonic anemometry and thermometry capable of capturing high-frequency signals of turbulence fluxes in the atmospheric boundary layer. With his associates, Dr. Kaimal corrected the sonic temperature signal by the cross-wind velocity contamination. This provides a very close approximation of the atmospheric virtual temperature which is one of the main variables in observational and modeling studies of the atmospheric boundary layer.

Dr. Kaimal undoubtedly leaves a great legacy to researchers in the area of turbulence parameterizations of the atmospheric boundary layer and advanced remote sensing.

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