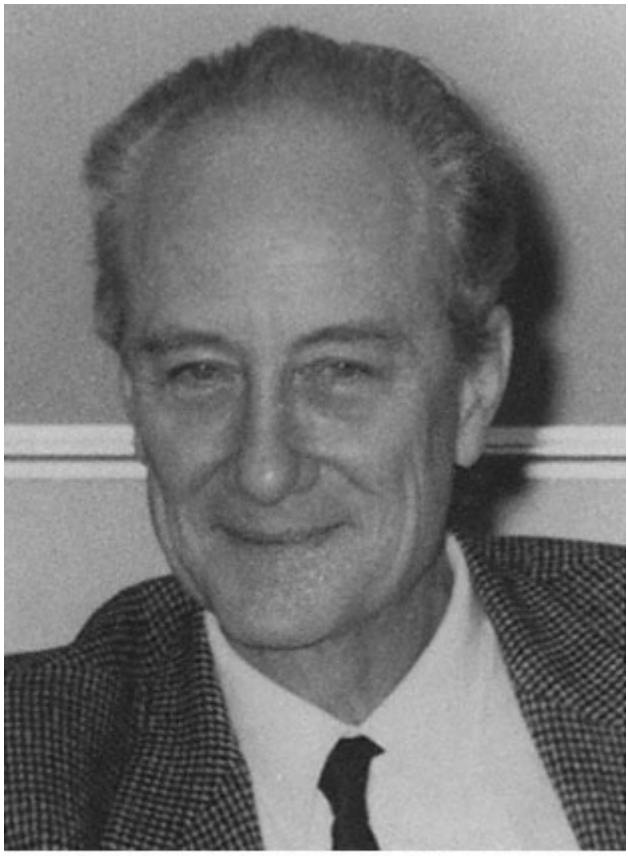

Luigi Crocco

1909–1986

By Seymour M. Bogdonoff

Luigi Crocco, former professor of the University of Rome, of Princeton University, and of the l'Ecole Centrale des Arts et Manufactures, died of a heart attack in Rome on the evening of November 19, 1986. Originally trained as an applied mathematician, Professor Crocco became one of the pioneers and leading forces in the fields of theoretical aerodynamics and rocketry and jet propulsion during a long and illustrious career in academia.

Born on February 2, 1909, in Palermo, Italy, Crocco began to conduct research during his undergraduate years at the University of Rome, where he received his B.S. in mechanical engineering in 1932 and his Ph.D. in mechanical engineering in 1936. By the time he completed his degrees, he was already heavily involved in rocketry and theoretical aerodynamics and had published several papers. (There were some who mistook these early works for publications of his well-known father, General Luigi Crocco.)

Crocco remained at the University of Rome as an assistant professor after receiving his Ph.D and became a full professor in 1939. During the 1930s, he generated a series of critical papers in theoretical aerodynamics: his derivation of the Crocco energy integral for boundary layers (1931), his vorticity theorem (1936), his definition of the Crocco point of gas dynamics (1937), and his introduction of the Crocco transformation in boundary layer theory (1939).

In 1949 he was invited to become a visiting professor in the Department of Aeronautical Engineering at Princeton University, and, in 1952, on the recommendation of Theodore von Karman, he accepted the Robert H. Goddard Chair of Jet Propulsion at Princeton and became the director of the Guggenheim Jet Propulsion Center, one of two such centers founded in the United States under a grant from the Guggenheim Foundation.

During his tenure at Princeton, Crocco turned his great talents to the study of the rapidly growing field of rocket propulsion. He developed his now well-known theory of combustion instability in rocket motors and remained an international leader in this field for many years. In addition to his interest in rockets, he used his expertise in mathematics and fluid physics to study complex fluid mechanical problems associated with viscous flows. He made seminal contributions to the understanding of boundary layer flows, separation, base flows, and transonic and supersonic aerodynamics. He was instrumental in developing mathematical and numerical methods to solve the fluid dynamic equations that provided the framework for many technical applications.

In the propulsion field, his contributions were made in the combined areas of fluid mechanics and combustion as applied to propulsion devices, work through which he made contributions to both liquid and solid rocket combustion. His critical contributions to the theory of rocket combustion instability were an important factor in the design of reliable thrusters of the period. He also applied propulsion theory to some of the earliest work in orbital mechanics and space flight.

During the late 1960s, Crocco's wife, Simone, became ill, prompting their return to Europe. In 1968 he became a Fulbright Professor of the Faculté des Sciences of the University of Paris. He returned briefly to Princeton in 1969, but in 1970 he settled permanently to Europe to facilitate his wife's medical treatment.

From 1970 until he retired in 1977, Crocco was a professor at l'Ecole Centrale des Arts et Manufactures in Paris. In that post, he continued his teaching and research; he also spent some time at the University of Rome, the Polytechnic Institute of Rome, and ONERA (the French counterpart of the National Aeronautics and Space Administration).

After his wife's death in 1981, he continued his research activity, visiting the United States and working closely with the theoretical aerodynamics group in Rome. He continued to enjoy theoretical work and devoted most of the later years of his life to the difficult challenge of understanding turbulence. He remained active until his sudden death at the age of seventy-seven.

Professor Crocco's stature in his field was recognized by the National Academy of Engineering, which elected him to membership in 1979. He was also a member of the Accademia Nazionale dei Lincei, the Accademia delle Scienze di Torino, the International Academy of Astronautics, l'Aerotecnica, and the Société Ingénieurs Civils de France. He was a fellow of the American Institute of Aeronautics and Astronautics (AIAA) and received the AIAA Pendray Award in 1965, the AIAA Wilde Award in 1969, and the Columbus International Prize and Gold Medal in 1973.

His ability to combine elegant mathematics and physical insights in solving practical problems in aeronautics and propulsion made him highly sought after as a consultant for industry and government in both the United States and Europe. Curtiss Wright, the Bendix Corporation, Aerojet-General, General Dynamics, Reaction Motors, Arthur D. Little, General Electric, RCA, TRW, and the National Aeronautics and Space Administration in the United States, as well as the European Space Agency, Fiat, the French Defense Ministry, and the Advisory Group for Aerospace Research and Development of the North Atlantic Treaty Organization, were among the organizations that received his assistance and counsel.

As a professor, Luigi Crocco was instrumental in developing

and influencing a group of students in the United States and Europe who today occupy key positions in industry, government, and universities. The combination of these students and almost one hundred of his technical papers had an extraordinary impact on the development of the fields of aeronautics and space propulsion. In 1985 in honor of Crocco's seventy-fifth birthday, Plenum Press published a book entitled *Recent Advances in the Aero-Space Sciences*, which was edited by Corrado Casci and consisted of scientific papers by Crocco's colleagues and students.

Luigi Crocco was a European "aristocrat" in the best sense of the term. He was gently mannered and cultured, with a keen intellect and a warm handshake that made one feel special. His ability to make clear, at any level, the complex phenomena with which he worked made him one of the influential figures of a major growth period in the aerospace era.