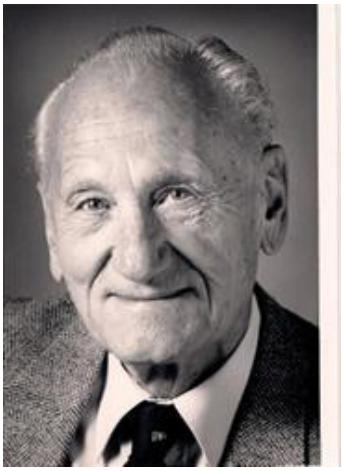

IN MEMORIAM

Antoni Kazimierz Oppenheim
Professor of Mechanical Engineering, Emeritus
UC Berkeley
1915 – 2008

Antoni Kazimierz Oppenheim, professor emeritus of mechanical engineering at the University of California, Berkeley, and one of the world's leading combustion experts, died of cancer on Saturday, January 12, 2008, in his sleep at his Kensington, California home. Known for his extraordinary passion for combustion research, he continued to work right up to the end while under hospice care, sitting up in bed revising his latest technical paper.

Professor Oppenheim was born in Warsaw, Poland, on August 11, 1915. He was homeschooled in French until the age of nine, when he attended local schools and began learning Polish. After graduating as valedictorian from his high school in 1933, he entered the highly competitive Warsaw Institute of Technology, where he studied aeronautical engineering. His studies were interrupted in 1939 by Nazi Germany's invasion of Poland. Tony fled his home country, making his way through Romania, Greece, France, Spain, and Portugal, before arriving in England in June 1940. Soon after, he enlisted in the Free Polish Army in Scotland and taught himself English. In 1943, on leave from the Polish Army, he managed to complete his requirements for a degree from the Warsaw Institute of Technology by taking courses at the City and Guilds College in London. He also earned a Ph.D. in mechanical engineering at the University of London, and a Diploma of Imperial College (DIC) in 1945.

After completing his studies, Oppenheim spent three years as lecturer in mechanical engineering at City and Guilds College, where he and his postgraduate students built that institution's first supersonic wind tunnel. During his stay in England, he worked with other scientists to improve the engines used in Britain's Spitfire and Hurricane fighter planes which, until then, had been outperformed by German warplanes. According to J. Ray Bowen, dean emeritus at the University of Washington's College of Engineering and one of Oppenheim's first Ph.D. students, Tony's research provided the critical edge in speed and acceleration the British aircraft needed. Oppenheim also was charged with analyzing the operational mechanism of pulsed- jet engines, which powered the German V1 flying bombs, pilotless monoplanes carrying one- ton warheads. After the war, he was sent to Germany as a British intelligence officer to meet with the scientists and engineers involved in developing the V1 engine. His interest in detonation and combustion grew from this early research in pulsed-jet engines.

In 1948, Oppenheim moved to the United States, joining Stanford University as an assistant professor in mechanical engineering. Two years later, he made his way to UC Berkeley as an assistant professor in mechanical engineering. He was promoted to associate professor in 1954 and professor in 1958. His Berkeley colleagues described him as larger- than- life, an outstanding scholar with an incredibly dynamic personality whose contributions to the field of combustion were enormous. At a time when the mechanics of detonations were largely a mystery because of their speed, Oppenheim tackled their study by developing high- speed

photography using a laser light source to capture near nanosecond exposures. As a result of this technique, he was able to conduct experiments that led to groundbreaking descriptions of blast waves and of the detailed processes by which a detonation occurs.

Professor Oppenheim was among the first to apply supersonic instrumentation and shock tubes to the study of combustion and detonation. He also developed a method for quantifying radiation heat transfer with a network analog, much like an electronic circuit, with the radiative flux as current and emissive power as potential. This method for studying radiation heat transfer is now taught in universities throughout the world. His impact on heat transfer education was enormous.

In 1967, Oppenheim cofounded the International Colloquia on the Dynamics of Explosions and Reactive Systems, a series of scientific meetings held every two years for specialists in explosion and transient combustion phenomena. For many years he addressed making improvements to the internal combustion engine. Currently, spark plugs ignite a fuel- air mixture injected into a cylinder. Because the ignition occurs at a point, a significant amount of fuel may be left unburned in the cylinder. The incomplete combustion results in increased emissions and decreased efficiency. Oppenheim proposed and tested a torch ignition system in which the fuel- air mixture is effectively ignited over a significant fraction of the cylinder volume. Experiments showed that this more efficient system allows for a leaner fuel- air mixture and lower operating temperatures. He calculated that this system could ultimately nearly double gas mileage, while dramatically reducing pollution in current internal combustion engines.

Highlights among the awards, prizes, and honors Oppenheim received throughout his career were the Dionizy Smolenski Medal of the Polish Academy of Sciences, for outstanding contributions advancing the knowledge of combustion and especially of the dynamics of explosions and reactive systems; the Alfred C. Egerton Gold Medal of The Combustion Institute for distinguished lifelong contributions to the field of combustion; the Pendray Award of the American Institute of Aeronautics and Astronautics (AIAA); and the inaugural award of the Oppenheim Prize, named for him, of the Institute for Dynamics of Explosions and Reactive Systems.

Oppenheim received honorary doctoral degrees from the University of London, the University of Poitiers (on its 500th anniversary), and the Technical University of Warsaw. He was elected a member of the United States National Academy of Engineering, and a foreign member of the Polish Academy of Sciences. Professional society recognition is represented by his being elected member of the International Academy of Astronautics; fellow, and then honorary member (the highest honor) of the American Society of Mechanical Engineers (ASME); fellow of the American Rocket Society (ARS) and the American Institute of Aeronautics and Astronautics (AIAA), the successor society; fellow of the Society of Automotive Engineers (SAE). He was a registered professional engineer in California. In honor of his 80th birthday, his former student J. Ray Bowen edited a research volume, Dynamics of Exothermicity, published in 1996.

Campus recognition of Oppenheim's contributions to scholarship, and to his academic home for four decades, was the award, in 1988, of the Berkeley Citation, the highest honor bestowed by the University of California, Berkeley, to those who have significantly exceeded the standards of excellence in their fields and made exceptional contributions to the University. He officially retired from UC Berkeley in 1986, only because of the then required retirement at age 70; but he remained a diligent and active researcher who could be found at his desk in his campus office from 7:30 a.m. to 6:00 p.m. daily, nearly until his death.

Professor Oppenheim is survived by his wife of over six decades, Lavinia (Min) of Kensington; their daughter, Terry Ann Cort of El Cerrito; and two grandchildren, Jessica and Zachary.

Patrick J. Pagni
Stanley A. Berger