
Stephen Whitaker (1932-2023)
Chemical engineer who researched porous materials and fluid
mechanics

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Stephen Whitaker was a chemical engineer who made significant contributions to our understanding of the micro-macro connections exhibited in multiscale systems, and particularly for porous materials. Steve had an interest in a huge array of topics relating to the description of continuum mechanical systems spanning disciplinary ranges from biology, thermodynamics, fluid mechanics, and material sciences. The body of work developed leaves a legacy characterized by originality and deep insight. Always an avid and eager explorer of new areas of interest, Steve authored five textbooks (on the topics of fluid mechanics, heat transfer, volume averaging, and a text on chemical process engineering aimed primarily at undergraduates), often with the stated intent of learning the subject better himself. Steve was involved in writing more than two hundred papers on a range of subjects in chemical engineering, with his primary interests being the topic of *upscaling* in multiphase systems. He passed away near his home on the Northern California coast on 9 May 2023 at 90 years of age.

Steve had an almost storybook upbringing in the town of Carmel-by-the-sea, California in the 1940s— long before it had become the well known destination it is today. His father Francis Whitaker was the town blacksmith; Steve’s hands-on upbringing helped establish his practical ethic for working hard and striving to conduct his research with the highest standards of quality possible. It is an interesting side note that Steve’s father was, in addition to being a blacksmith, a luminary of both the arts and the evolving California intellectual scene in the 1950s. Steve grew up with notable personalities such as John Steinbeck and Leon Uris (authors who each created characters based on the senior Whitaker in their books) visiting his father’s “Forge in the Forest”, which almost certainly influenced Steve’s intellectual interest and pursuit of knowledge for the sake of knowledge.

Steve graduated from Carmel High School, and went on to University of California, Berkeley to earn his Bachelor’s degree in Chemical Engineering. He then attended the University of Delaware where he worked with the distinguished Chemical Engineering scholar Robert Pigford, earning his PhD in Chemical Engineering in 1959. After working with applied engineers and scientists for some years at DuPont in Wilmington, Delaware, he accepted a position as a new Assistant Professor at Northwestern University in 1961. Although Steve enjoyed his foray into life on the east coast, his heart and soul belonged in the west, and especially to his native California. In 1964 he accepted a position as an Assistant Professor at the newly-established Department of Chemical Engineering

at the University of California, Davis. This would be his academic home for the next 40 years. The new college at UC Davis was an ideal proving ground for young and energetic faculty members like Steve. Steve immediately set to work, developing a research program in continuum mechanics. While his early papers were related primarily to fluid mechanics, and in particular the interfaces between fluids, in 1966 he set himself on the path that would prove to be the central focus of his research for the next 60 years. The topic of balance laws in porous materials had caught his interest (possibly in part due to a series of energetic discussions on the topic with his colleague John Slattery at Northwestern). In 1966 Steve published the paper *The equations of motion in porous media* in the journal *Chemical Engineering Science*; while the byline of that paper reflected his previous affiliation with Northwestern, this nascent area of research was more representative of the boundless opportunities at the newly formed Department of Chemical Engineering at UC Davis. During his time at Davis, Steve published hundreds of papers primarily on problems in continuum mechanics, and usually involving the homogenization method known as volume averaging theory.

Steve collaborated widely and enjoyed traveling to conduct research. His collaborations spanned the globe, and included colleagues from South America, Asia, and Europe. He had a particular connection with researchers in France and in Mexico, and he had the opportunity to teach classes in both countries; remarkably, he was sufficiently fluent to instruct in both the Spanish and French languages. France, in particular, became his research home away from home, and he had many collaborators across the country. In 1985 while on sabbatical at the University of Bordeaux, he met a researcher named Michel Quintard, and struck up a decades-long collaboration that solidified Steve's interest in careful analysis of upscaling methods for multiphase problems. Many important ideas were developed in that collaboration, and in particular the notion that one might *compute* the effective properties of porous materials became central.

Clear and effective teaching was one of Steve's passions. During his career at UC Davis he helped teach thousands of students, and he received numerous awards for teaching. Steve particularly enjoyed presenting complex subjects in a manner that was pedagogically clear and concise so as to reach the broadest possible audience. He was especially proud to have received the "Jeff and Dianne Child/Steve Whitaker Professorship in Chemical Engineering and Material Science," which was specifically created to recognize Steve as "one of the department's finest professors."

Steve was a member of the Interpore society for porous media, and was awarded one of its Lifetime Memberships to recognize his contributions. He was also honored by being among those who were asked to be the subject of an Interpore "Time Capsule" in which he was interviewed to reflect upon his many years as a researcher in porous materials research.

It is the rare individual where words alone fail to express the generosity of spirit that person embodied. Steve Whitaker was such a person. His impact on both the discipline of Chemical Engineering, and on those that he interacted with will continue to resonate. There are few higher accolades that can be bestowed than this; he will be sorely missed.