Project Pioneer: Dr. David L. Whitfield

Dr. Dave Whitfield grew up as a farm boy in Paoli, Okla., raising cattle and growing crops with his grandfather and uncles.

Just before his senior year in high school, he moved seven miles down the road to Pauls Valley, Okla., primarily to play basketball. There was, however, another advantage to the move.

"Pauls Valley High School allowed me to take the math and physics classes I needed for college," he said. "Paoli didn't have high school math or physics at the time."

After graduation, Dr. Whitfield was offered a full scholarship to play football at Oklahoma State University (OSU), which helped provide the necessary funds for his college education.

Dr. Whitfield credits his older brother, Dr. Jack Whitfield, as the one who influenced him to go into the field of engineering.

Jack Whitfield also helped Dr. Whitfield find his way here to the U.S. Air Force's Arnold Engineering Development Center (AEDC), providing him the opportunity for a summer internship at Arnold after his junior year in college. By the time Dr. Whitfield graduated from OSU, he knew he wanted to work here full-time.

"I knew that AEDC was where I wanted to work," he explained. "Coming to Tullahoma, Tenn., also afforded me the opportunity to pursue my graduate degrees at the University of Tennessee Space Institute while working full time at AEDC."

When he began his career in June 1966, Dr. Whitfield could not have imagined the challenges he would have ahead of him as he focused his research interests in the field of computational fluid dynamics (CFD).

He defines CFD as the computational simulation of fluid flow resulting from the numerical solution of time-dependent conservation-law-equations.

At AEDC, CFD was used to supplement wind tunnel testing, but according to Dr. Whitfield, not a lot of people believed in CFD in the early 1970s.

"In fact," he said, "my efforts to promote CFD within AEDC in the early 1970s probably got me kicked-out, or through, most mahogany doors. However, when CFD was used to explain the source of the flow angularity problem in the test section of 16T, and when AEDC Fellow Dr. John Adams' CFD group in VKF explained how a tunnel there was

actually operating at Mach 12 and not Mach 16 as previously thought, CFD found new life."

"I was told once that 'AEDC is a test-data place, and there is no place for CFD,'" he explained. "Our objective was to help those running the tunnels to be able to do their jobs better. I don't think AEDC should just be a 'test-data' place. Rather it should be a place for solutions and physical understanding of the problems, and this can be accomplished better by the mutual cooperation between those focusing on experiments and those focusing on numerics."

Working in VKF, what was then Aerospace Environmental Facility Chamber in Mark 1, ETF, and PWT, Dr. Whitfield spent the next 10 years focusing on the progress of CFD at the center.

Before leaving AEDC in 1980 to become a professor of aerospace engineering at Mississippi State University (MSU), he was the supervisor of the CFD section in PWT.

When asked how the technology has either become better, more complicated, or worse since first working with CFD, Dr. Whitfield said, "The field has changed, in part because what used to be considered a supercomputer now has less computing power than a desktop PC. I notice that jobs (computer runs) all run the same amount of time now as they did 25 years ago, but now much more can be accomplished in that time."

He feels the primary change in the field, however, is the number of people currently working with CFD.

"When I started, there were no more people working in the area in the world than what I could count on my fingers. I probably knew them all, and in most cases, knew their families."

Dr. Whitfield said that the use of CFD has now broadened to other areas of application including medicine, nanotechnology, and finance.

"CFD will continue to improve with regard to technology, and this CFD-originated technology base will find its way into other fields. This transition is already taking place."

In 2002, Dr. Whitfield left Mississippi State University and moved to the University of Tennessee at Chattanooga (UTC). There, he serves as the director of the university's SimCenter, which is the research arm of the Graduate School of Computational Engineering.

His experience at AEDC has played a significant role in his career because it has kept him "applications" oriented.

"I use my experience from AEDC to focus on getting the job accomplished (results). At AEDC I learned that quality work is the most important thing."

Whether inside the center's gates or outside in the world of academia, Dr. Whitfield always appreciated the caliber of people who worked at AEDC and the fact that many of the people within the AEDC community had superior skills when compared to their counterparts outside the gate, i.e. located at other institutions and centers.

"The folks at AEDC were outstanding, did their jobs because they loved them, and saw a need for what they did," he said. "Many of these folks are still at AEDC, and many have been replaced by equally devoted people. The United States still needs a vibrant AEDC."

During his career, Dr. Whitfield's work has been recognized on several occasions. He has been honored by being selected as an American Institute of Aeronautics and Astronautics Fellow, an MSU Distinguished Professor of Aerospace Engineering, an MSU Alumni Association Outstanding Researcher, and an MSU Hearin-Hess Professor for several years.