Project Pioneer: James Jacocks

Dr. James Jacocks' contributions to enhance AEDC's flight simulation capabilities brought national recognition to the center in the field of computational fluid dynamics (CFD) and earned him recognition as an AEDC Fellow in 1996.

Dr. Jacocks, a Sverdrup engineering specialist and 37-year AEDC veteran, made a name for himself early in his AEDC career as an engineering analyst in the transonic wind tunnel arena. He helped develop innovative wind tunnel designs, particularly with the 16-foot transonic tunnel and 4-foot aerodynamic tunnel, which brought him two United States patents.

The first was for his Swing Link Flexible Wind Tunnel Nozzle. Partnered with Karl Kneile, Dr. Jacocks developed a novel analysis tool for understanding jet engine inlet distortion data.

They analyzed time-varying inlet pressure data from several aircraft designs and, using statistical methods, proposed a model of distortion with three parameters that were evaluated by fitting inlet data using the method of maximum likelihood. This approach was widely adopted by the engine/airframe integration community.

The second patent was for his Adaptive Automatic Wall Wind Tunnel. He launched a comprehensive program of wind tunnel experiments and theoretical development, succeeding in proving the validity of local pressure and flow angle as a boundary condition for wall-interference estimates. He also showed that boundary-layer thickness was a dominant parameter for predicting perforated-wall characteristics. From this, he developed a semi-empirical mathematical relation that has been adopted world-wide as the boundary condition for perforated-wall test sections.

Working with Mr. Kneile again, Dr. Jacocks produced from scratch the world's first production-ready, boundary conforming, finite-volume, three-dimensional, inviscid, non-isentropic flow solver. With this tool, he began routine computational predictions of perforated-wall interference effects.

The tunnel user could now have a numerical prediction of the interaction of his model and the wind tunnel walls. If he chose, the tunnel user could correct his data and make it more interference-free.

Not only was Dr. Jacocks recognized for extraordinary, fundamental contributions to AEDC's ground simulation capabilities, including outstanding contributions to perforated-wall wind tunnel design and operation, but for leadership in bringing national recognition in the field of CFD.

His work with computational fluid dynamics earned him the nickname of “the Father of CFD at AEDC.” When he started using computers to help predict the interference effects of perforated wind tunnel walls on models, the computer codes of the time were inadequate and he became convinced AEDC had to move more aggressively into the area of computational fluid dynamics.

Because of his motivation, Dr. Jacocks quickly became the section supervisor of the CFD section located in the center’s PWT office. There he established the leading edge of world-class CFD installations. Engineers in his group abandoned the common practice of CFD engineers in the early 1980s of using a proliferation of codes, and, instead, focused on one solver. This gave his group tremendous power in solving routine wind tunnel problems.

Dr. Jacocks earned his bachelor’s degree at Georgia Tech in 1959. He earned his master’s and doctorate degrees at the University of Tennessee Space Institute in 1965 and 1976.

Dr. Jacocks passed away in 2001.