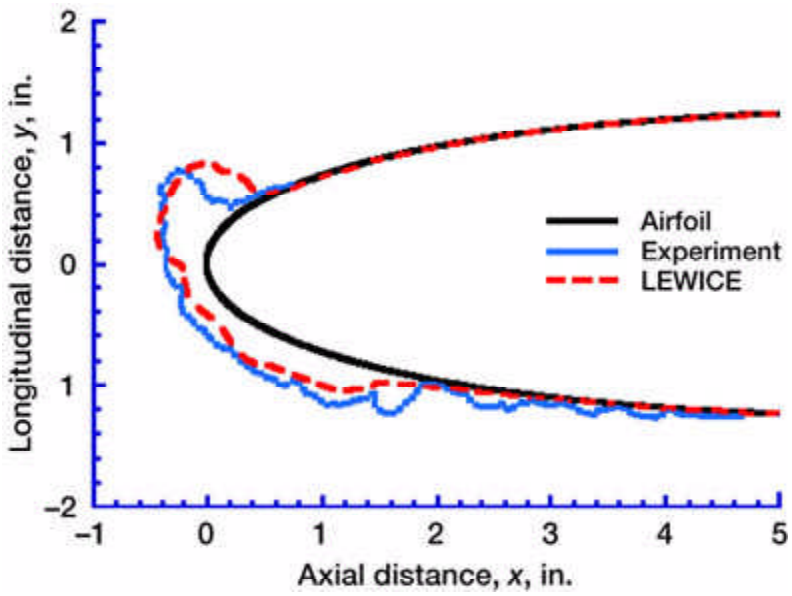
Software Released by LEWICE 2.0 Ice Accretion Software Development Project

Computational icing simulation methods are making the transition from the realm of research to commonplace use in design and certification. As such, standards of software management, design, validation, and documentation must be adjusted to accommodate the increased expectations of the user community with respect to accuracy, reliability, capability, and usability. With this in mind, in collaboration with Glenn's Engineering Design and Analysis Division, the Icing Branch of the NASA Glenn Research Center at Lewis Field began a software improvement project focused on the two-dimensional ice accretion simulation tool LEWICE. This project is serving as an introduction to the concepts of software management and is intended to serve as a pilot project for future icing simulation code development.

The LEWICE 2.0 Software Development Project consisted of two major elements: software management and software validation. The software management element consisted of identifying features of well-designed and well-managed software that are appropriate for an analytical prediction tool such as LEWICE and applying them to a revised version of the code. This element included tasks such as identification of software requirements, development and implementation of coding standards, and implementation of software revision control practices. With the application of these techniques, the LEWICE ice accretion code became a more stable and reliable software product. In addition, the lessons learned about software development and maintenance can be factored into future software projects at the outset.

The software validation activity was an integral part of our effort to make LEWICE a more accurate and reliable analysis tool. Because of the efforts taken to extensively validate this software, LEWICE 2.0 is more robust than previous releases and can reproduce results accurately across several computing platforms. It also differs from previous versions in the extensive quantitative comparisons of its results with a data base of ice shapes that were generated in Glenn's Icing Research Tunnel. The results of the shape comparisons were analyzed to determine the range of meteorological conditions under which LEWICE 2.0 is within the repeatability found for ice shapes obtained from experiments. These comparisons show that the average variation of LEWICE 2.0 from experimental data is 7.2 percent, whereas the overall variability of the experimental data is 2.5 percent.



LEWICE prediction compared with measured ice shape profile.

The LEWICE 2.0 Software Development Project resulted in the release, at the recent Icing Branch LEWICE Workshop, of a more useful and robust analysis tool than was previously available to the icing community. The lessons learned from this project will be applied to the Icing Branch's future software development efforts.

Find out more about this work and other Icing related research

http://icebox-esn.grc.nasa.gov/.

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