CFD Vision 2030 Study:
A Path to Revolutionary Computational Aerosciences

The ability to simulate aerodynamic and reactive flows using computational fluid dynamics (CFD) has progressed rapidly during the last several decades and has fundamentally changed the aerospace design process. Advanced simulation capabilities not only enable reductions in ground-based and flight-testing requirements, but also provide added physical insight, and enable superior designs at reduced cost and risk. In spite of considerable success, reliable use of CFD has remained confined to a small region of the operating envelope due, in part, to the inability of current methods to reliably predict turbulent, separated flows. The question could be asked if CFD has reached its limits. Or, will further research investments make CFD accurate, efficient, and reliable enough to enable future revolutionary gains in aerospace system performance and enable certification by analysis? Under NASA sponsorship*, Boeing and its partners (Pratt & Whitney, Stanford University, MIT, University of Wyoming and National Center for Supercomputing Applications) recently conducted the Vision 2030 CFD Study to develop a comprehensive vision and a research roadmap for advancing the state-of-the-art of CFD. Final Report of the CFD Vision 2030 Study is available at:
http://ntrs.nasa.gov/search.jsp?R=20140003093

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CFD Vision 2030 Study Recommendations

NASA should:

1. Develop, fund and sustain a base research and technology development program for simulation-based analysis and design technologies.

2. Develop and maintain an integrated simulation and software development infrastructure to enable rapid CFD technology maturation.

3. Make available and utilize HPC systems for large-scale CFD development and testing.

4. Lead efforts to develop and execute integrated experimental testing and computational validation campaigns.

5. Develop, foster, and leverage improved collaborations with key research partners and industrial stakeholders across disciplines within the broader scientific and engineering communities.

6. Attract world-class engineers and scientists.
AIAA CFD Vision 2030 Integration Committee Established

The AIAA CFD Vision 2030 Integration Committee (CFD 2030 IC) was established to promote a community of practice engaged in developing methods, models, physical experiments, software, and hardware for revolutionary advances in computational simulation technologies for analysis, design, certification, and qualification of aerospace systems. CFD 2030 IC serves as the focal point for activities to achieve the 2030 Vision by leveraging and integrating enabling technologies such as high-performance computing, physical modeling, numerical methods, geometry/grids, validation quality experiments, multidisciplinary analysis and optimization, with quantified uncertainties. CFD 2030 IC will communicate with other Committees to assure that the AIAA membership engages with their peers and external constituencies in shaping the future of simulation-based engineering.

Keep up with the latest information and activities via the IC’s website: www.cfd2030.com