NASA
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Success
Stories

JTI Benefits from NASA Glenn Technology in Supporting the Nation's Constellation Program

Jacobs Technology Inc. (JTI)

TECHNOLOGY

The Space-Time Conservation Element and Solution Element (CESE) is a generic numerical method for systems governed by conservation laws such as fluid dynamics. The resulting computational fluid dynamic (CFD) formulation resolves flow fields with strong gradients and weak waves.

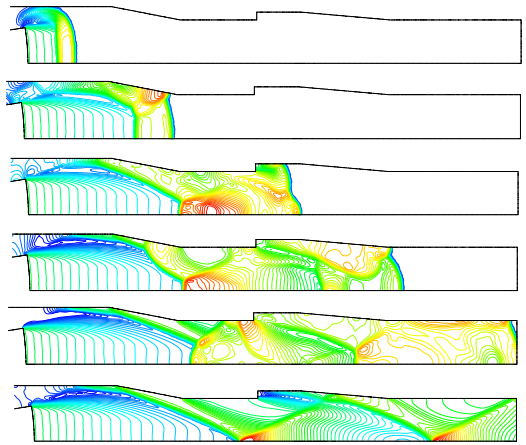
COMMERCIAL APPLICATION

◆ JTI specializes in the design, build, operation, and maintenance of specialized test facilities and systems for aerospace and automotive applications. JTI also provides a wide spectrum of multi-disciplined engineering services.

◆ Discussions with the CESE development team at NASA Glenn Research Center in 2001 were instrumental in helping JTI to investigate the method. JTI has since developed a code utilizing the CESE method that has been employed in several applications. The capability of this advanced solver method consistently demonstrates realistic solutions to real world problems. Since July 2006, the method has been successfully used in the aerodynamic design of the NASA Stennis Space Center A3 Altitude Rocket Test Stand, a program developed to support the Nation's Constellation Program.

SOCIAL / ECONOMIC BENEFIT

◆ JTI is one of the nation's premier suppliers of technical facilities for aerospace and aerodynamic testing – providing reliable, economic, and innovative aerodynamic design solutions. The advanced, predictive, and efficient nature of the CESE method has been recognized and proven by JTI. The method is an indispensable CFD tool for supporting JTI's engineering solutions for the Nation's on-going space program.



This progression of snapshots illustrates a rocket firing in a wind tunnel environment under altitude pressure conditions. The snapshots of the pressure field show the transient development of the rocket blast waves occurring at the start up of the supersonic rocket.

NASA APPLICATIONS

◆ The CESE method was developed by NASA Glenn Research Center to examine aeroacoustic problems such as jet noise, turbo machinery noise, and acoustic disturbance in hypersonic test facilities. The method resolves strong gradient phenomena while capturing weak waves over a wide range of flow speeds. The capability offered by this solution makes the method generally applicable to all flow-induced noise problems.

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