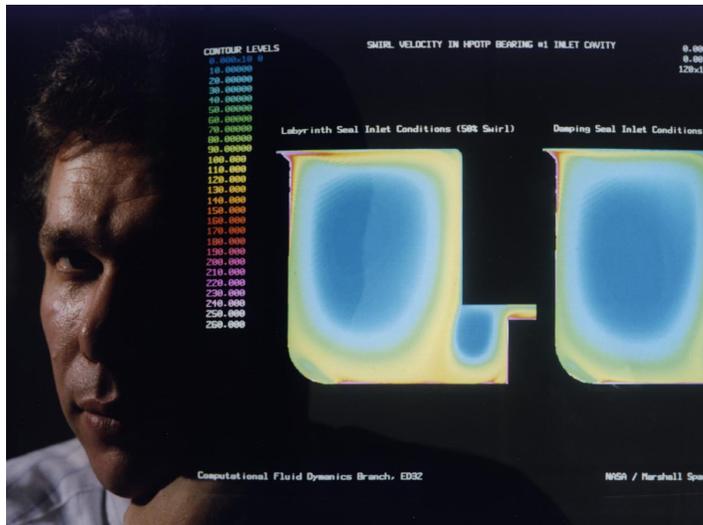


Technology Opportunity

Fluid Dynamics Analysis and Testing at Marshall Space Flight Center

NASA-developed technology dealing with the dynamics of fluids in spacecraft and propulsion systems is available to U.S. industries and universities through the agency's Technology Transfer program.

The Fluid Dynamics Division of NASA's Marshall Space Flight Center (MSFC) in Huntsville, Alabama, provides analytical and experimental research and development of aerodynamic parameters, aerodynamic heating and external gas properties, acoustics and unsteady flows, rocket exhaust plume characterization and heating effects, internal flow characteristics of liquid and solid propellant systems, ground test simulation, and dynamic data analysis. The Division's computational and experimental capability to analyze propulsion systems/components is a key element in the MSFC strategic plan for a propulsion center of excellence for NASA.



The Computational Fluid Dynamics Branch of MSFC's Structures and Dynamics Laboratory is the hub of activity for development and testing of aerodynamic and aerothermodynamic design criteria for spacecraft and propulsion systems to carry us safely into the 21st Century.

Potential Commercial Uses

Aerospace applications for this NASA-developed technology include launch vehicles, rocket engines, pumps, turbines, nozzles, and injectors. In recent non-aerospace applications, this technology has been used to improve a water-jet pump, analyze and test an automotive power steering pump, and redesign a prosthetic hip joint.

Benefits

MSFC has been NASA's principal Center for the development and evaluation of spacecraft propulsion systems since the beginning of the U.S. space program in the 1950's. America's aerospace, automotive, and medical industries can now take advantage of MSFC's expertise—saving valuable time and money in the development of more effective and efficient propulsion components.

The Technology

With computational fluid dynamics and experimental fluid dynamics, Marshall's scientists are able to analyze and test propulsion systems and components.

Computational Fluid Dynamics—MSFC engineers and physicists select, assess, measure, improve, and streamline computer codes to use when analyzing liquid and solid fluid systems and components. In-house computer resources include



networked workstations and a Cray supercomputer, as well as visual and animation capabilities.

Experimental Fluid Dynamics—Scientists apply scale model testing in unique world-class facilities which make up the Cold Flow Propulsion Test Complex. Types of flows investigated here include steady and unsteady, reacting and non-reacting, and single and multiphase flows over a wide range of velocities.

The Liquid/Solid Rocket Engine Water Flow Facility uses transparent models, allowing scientists to see and measure the flow of the liquid through the component.

The Liquid Rocket Engine Air Flow Facility is used to measure liquid flow and to investigate fluid-elastic stability. Models used in this facility are typically full scale and contain elements of salvaged engines.

The Solid Rocket Motor Air Flow Facility is used to conduct experimental studies of internal flow phenomena related to solid propellant rocket motors. Full or subscale models are used to test flow and heat transfer in this type of rocket motor.

The Air Flow Turbine Test Equipment is used to test overall performance and flow details in gas turbines of rocket engines. This facility is unique in both government and industry because it has the capability to test full scale turbopump turbines and accurately control the pressure, temperature, shaft speed, and pressure ratio.

The Inducer Test Loop provides MSFC scientists with the capability to use water to measure the performance and environments of existing and future advanced rocket turbopump inducers.

Technology Transfer

More information about MSFC's Fluid Dynamics Analysis and Testing capabilities is available through Marshall's Technology Transfer Office. Representatives from this office can help you determine how this technology can be used to help your company grow and prosper in today's competitive marketplace.

■ Contacts

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Additional information about NASA's Technology Transfer Program and a Technology Transfer Agreement are available on the World-Wide Web:

(<http://tectran.msfc.nasa.gov>)

Key Words

Fluid Dynamics
Computational Fluid Dynamics
Experimental Fluid Dynamics
Structures and Dynamics Laboratory
Technology Transfer

