DLR | Institute of Aerodynamics and Flow Technology
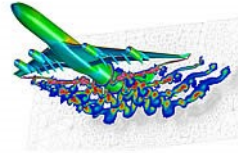
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Research and work areas of the Institute

The Institute of Aerodynamics and Flow Technology is a leading research institute in the field of aerodynamics/aeroacoustics of airplanes and aerothermodynamics of space vehicles. It has two main sites at Braunschweig and Göttingen and has a division at Cologne. 159 Scienttists - the total personal is 232 - are engaged in numerical and experimental investigations on air- and space vehicles. Experiments are performed in wind tunnels and in flight.

The institute coordinates its efforts with the German/European Aerospace industry and with a large number of universities. It is acting as a link between the basic research at the universities and industrial application. This results in a large number of cooperative national/European research projects.

Numerical simulation of the vortexes for an aircraft in take off

Related Topics

Avionics and Aircraft Instrumentation

Aircraft Propulsion and Power

Structural Mechanics

Acoustics

Aerodynamic

Lasers and Masers

Aircraft Design, Testing and Performance

- **Software Development**
  - CFD/CAA Methods (Physical Models, Flow Solvers, Grid Generation)
  - Aerodynamic Design and Optimisation Techniques (Stochastik/Deterministic Methods, Adjoint Method)
  - Integration of Disciplines (Structure, Flight Mechanics)
  - Aircraft Design / MDO
  - Verification and Validation
  - Software Support

- **Aircraft Aerodynamics**
  - Numerical and Experimental Analysis, Design and Optimisation
  - Wake-Vortex Interactions
  - High-Lift Systems, Engine-Integration
  - Fluid-Structure-Coupling

- **Aircraft Design and Assessment**
  - Assessment of Technologies and of the Complete Aircraft
  - Tools from Handbook Methods to High-Fidelity Techniques
  - Multidisciplinary optimisation of transport aircraft using a combination of methods from conceptual design software to high-fidelity CFD-CSM

- **Experimental Methods**
  - Wind Tunnel Investigations (Aerodynamic Derivatives, High-Lift Configurations, Airframe-Engine Integration, Low Drag Configurations)
  - Aircraft Models
  - Development / Application of Measurement Systems (e.g. Infrared Transition Detection)
  - Inflight Testing
  - System Competence for Laminar Flow Technology

- **Military Aircraft**
  - Assessment and Design of Configurations (Transporter, Stealth Technology, UAV)
  - Maneuvering Aircraft

- **Helicopter Aerodynamics**
  - Numerical and Experimental Analysis of Flow Phenomena
  - Fluid-Structure-Coupling

- **High-Speed-Configurations**
  - Design, Analysis and Optimisation of Supersonic Aircraft
  - Hypersonic Missiles

- **Spacecraft**
  - Aerodynamic and Aero-Thermodynamic Analysis of Spacecraft
  - Fluid-Structure-Coupling

- Analysis of Satellite Control Engines

- **Aeroacoustics**
  - Noise Measurements
  - Noise Prediction (Airframe, Propeller, Helicopter)
  - Aeroacoustic Design
  - Development of Noise Reduction Techniques
  - Prediction and calculation of noise emissions due to traffic

- **Technical Flows**
  - Automotive Aerodynamics
  - Landing Gear Analysis
  - ICE Train Passing
  - Automotive Cooling Fans
  - Wind Turbine Design
  - Aircraft Cabin Flows

- **Flow Measurement Technology**
  - Field Measurement Methods (PIV, LDA, BOOT, Rayleigh)
  - Surface Measurement Methods (PSP, TSP, Moire)
  - Flow Visualisation Techniques (Surface Oil Flow, Smoke Wire Flow, Hotfilm, Hotwire, Laser Light Sheet, Liquid Crystal Techniques, Hydrogen Bubble Flow, BOS, BOSS)

- **Acoustic Measurement Technology**
  - Acoustic Flight Testing Techniques (e.g. Helicopter Blades)
  - Ground Microphone Array
  - Acoustic Mirror
  - Acoustic Wind Tunnel (AWB)

- **Hardware**
  - Wind Tunnel Models
  - Measurement Sensors (Free Flight Tow Sensors, Wake Rakes, Hot Film, Hot Wire Anemometry, Steady/unsteady pressure measurements)
  - Measurement Equipment (Computer, Datenrekorder, Infrarotkameras, Hochgeschwindigkeits Schlieren Kamera, PIV Systeme, Akustische Spiegel, Mikrophonfelder, Derivative Balance)
  - Wind- and Water Tunnels: HEG, 1MG, TUG, WSG