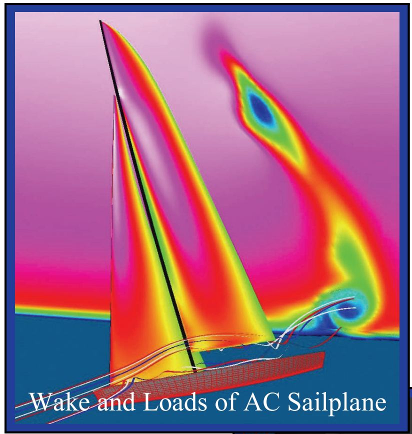
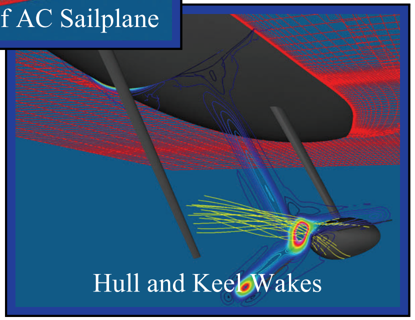
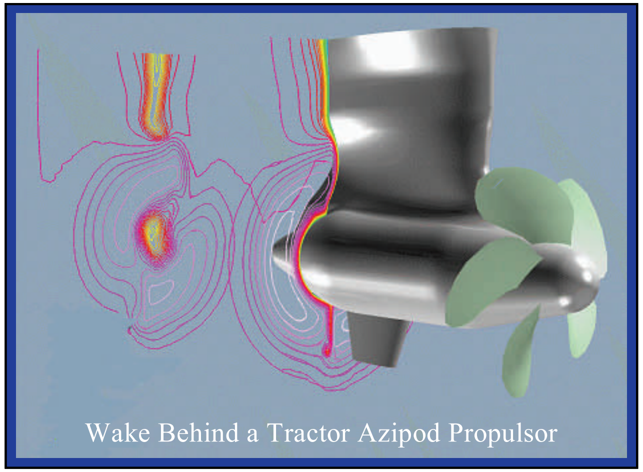

Wake and Loads of AC Sailplane


Hull and Keel Wakes

AFT RANS codes meet the demands of multi-variable, multi-disciplinary design.

Since its inception, AFT has assisted America's Cup teams over the last 4 editions by providing performance analyses of yachts, keels, rigs, and sails. In the 33rd America's Cup, BMW Oracle Racing's concurrent design approach required a huge number of runs covering a wide range of design variables and operating conditions.

AFT met this challenge thanks to well-developed automated gridding and problem set up schemes that require very little human intervention. Over 100 separate design studies of soft sails, rotating wing mast, rigid wing sail with and without foresails were investigated, and more than 10000 three-dimensional RANS analyses completed (~7 million points each), over an 27 month period. The studies guided the aerodynamic design of the rig of the trimaran, and ultimately proved to be a fundamental contribution to the team's final victory of the America's Cup. The world's oldest sporting trophy.


Wake Behind a Tractor Azipod Propulsor

AFT realizes the successful application of advanced design tools depends on operator experience as well as software capability.

That's why their Principal Scientist, Dr. Richard Korpus, has more than 20 years experience developing, verifying, and applying RANS codes and their associated support tools. He helped pioneer the application of RANS to practical problems by developing one of the first, and still most reliable, overset methods. His interest in applying RANS to engineering design extends to marine and aerospace vehicles, fluid/structures interaction, design optimization, hydro- and aero-dynamic wake signatures, acoustics, and novel forms of propulsion.

Dr. Korpus received his Ph.D. from the University of Michigan in 1989. He holds Masters degrees in both Naval Architecture and Aerospace Engineering. He founded AFT in August of 2000 after 12 years of developing RANS codes for other companies.

Dr. Claudio Cairoli joined AFT in late 2007, after working as naval architect. and teaching at the Massachusetts Institute of Technology. He earned a Ph.D. in computational hydrodynamics from MIT in 2006, as well as Masters degrees in Naval Architecture and Mechanical Engineering.

APPLIED FLUID TECHNOLOGIES

Efficient Solutions for Complex Flows

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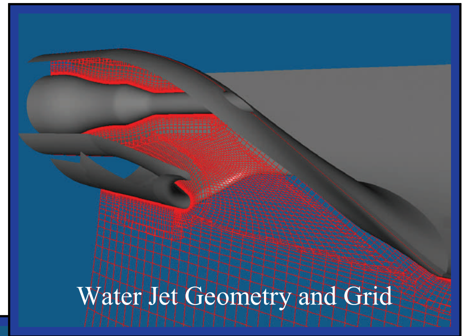
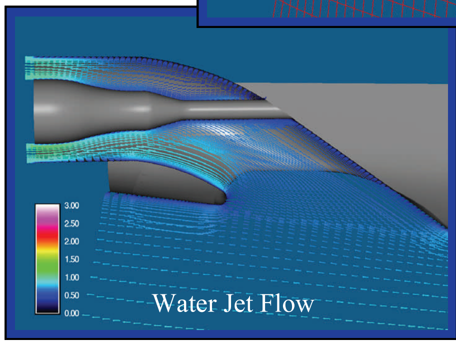

Water Jet Geometry and Grid



Water Jet Flow

APPLIED FLUID TECHNOLOGIES

Applied Fluid Technologies (AFT) brings state-of-the-art Computational Fluid Dynamics into the realm of practical engineering design.

Its Reynolds-Averaged Navier-Stokes (RANS) tools provide the accurate, timely, and cost-effective flow detail needed to promote high-performance and profitable designs.

This pairing of accuracy and efficiency provides an unparalleled tool for solving fluid related design problems. The approach has been successfully applied to a wide range of business sectors including: marine hydrodynamics, aero-dynamics, propulsor integration, fluid-structures interaction, chemical, automotive, offshore oil exploration, acoustics, environmental, and nuclear.

High-fidelity flow simulations are an essential element in today's design process.

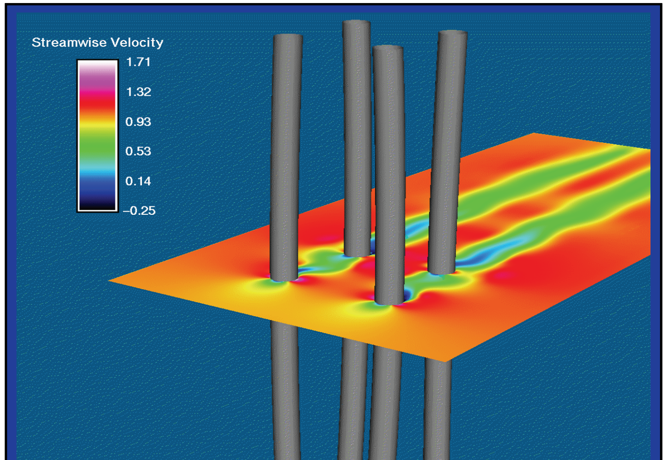
Whether developing new concepts (for which little full scale experience may be available) or finding the last fraction of performance on an existing concept, a detailed understanding of the operating environment is critical.

RANS is the most physically realistic way to study such flows. Unlike the alternatives, RANS resolves viscous and vortical effects, predicts flow separation, and includes the influence of turbulence. It handles Reynolds numbers at any scale, and provides an almost unlimited level of detail.

While this level of precision may not be required for every design, it can be essential for others. If a design trade-off is expected to affect:

- skin friction or form drag
- separation extent or downstream wake effect
- vortex shedding
- propulsor inflow or hull integration efficiency
- turbulence effects
- acoustic or non-acoustic signature

the resulting product will likely suffer unless the full impact of each alternative in known.



Offshore Riser Vortex-Induced Vibration

Examples of past AFT applications include some of the most demanding problems faced by today's engineers, researchers, designers, and operators.

A partial list of our staff's extensive RANS experience includes:

- efficiency assessment of high-power water jets
- propulsor design for ships and submarines
- optimization of podded propulsor geometries
- prediction of Vortex Induced Vibration (VIV)
- optimization of multi-component wings with localized separation (e.g. America's Cup yacht sails, hulls, and appendages)
- design of lifting bodies under a free surface
- development of ship roll prediction models
- design optimization of integrated propulsors
- nuclear & chemical reactor vibration mitigation
- performance prediction of "swimming" robots
- analysis of deformable or interacting bodies
- prediction of automobile drag and noise
- submarine signature reduction studies
- design of high-speed, high-power ships
- flow support for environmental impact studies
- development of improved model test procedures

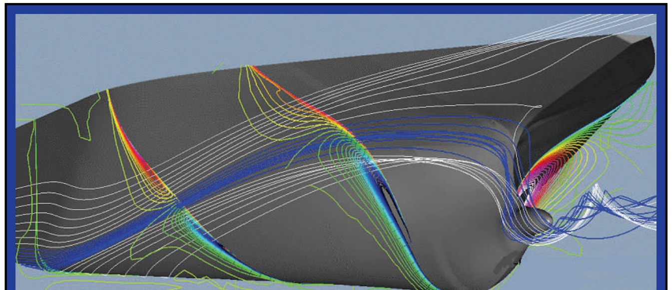
Examples of the first six applications are given in the figures scattered throughout this brochure.

AFT's approach to viscous flow simulation is unique in its ability to support design-cycle time frames.

It utilizes the concept of "overset" gridding to simplify problem setup and permit automation when a large number of simulations are required. Overset methods have the advantage that the usual time bottleneck for initial CFD model generation does not significantly increase as geometric complexity does. It also allows for the efficient utilization of grid points, and therefore shorter runs times with greater solution accuracy. An example of overset gridding is shown on this brochure's cover.

AFT utilizes two RANS codes for its work. The first is the Applied Fluid Technologies Incompressible Navier-Stokes (AFTINS) software package, and the second is NASA's OVERFLOW code. Both are overset based, and offer a choice of turbulence models. AFTINS is a purpose-built incompressible code, and can perform time-accurate simulations at very low Mach number. OVERFLOW is based on the artificial compressibility approach. Utilizing two independent codes gives a huge advantage to AFT. It not only provides a means to check problem setup (grid quality, etc.), but also for building trust in the accuracy of RANS in general.

AFT is an all-in-one provider of design solutions: in fact besides the software and the expertise, AFT owns also the necessary hardware. Two different clusters of high-end 64-bit Intel architecture provide the computational power that allows AFT to either run jobs in a highly parallelized mode (up to 16 processors) or multiple 4-threaded jobs concurrently to maximize productivity.


Model-Scale Flow over a Self-Propelled Tanker