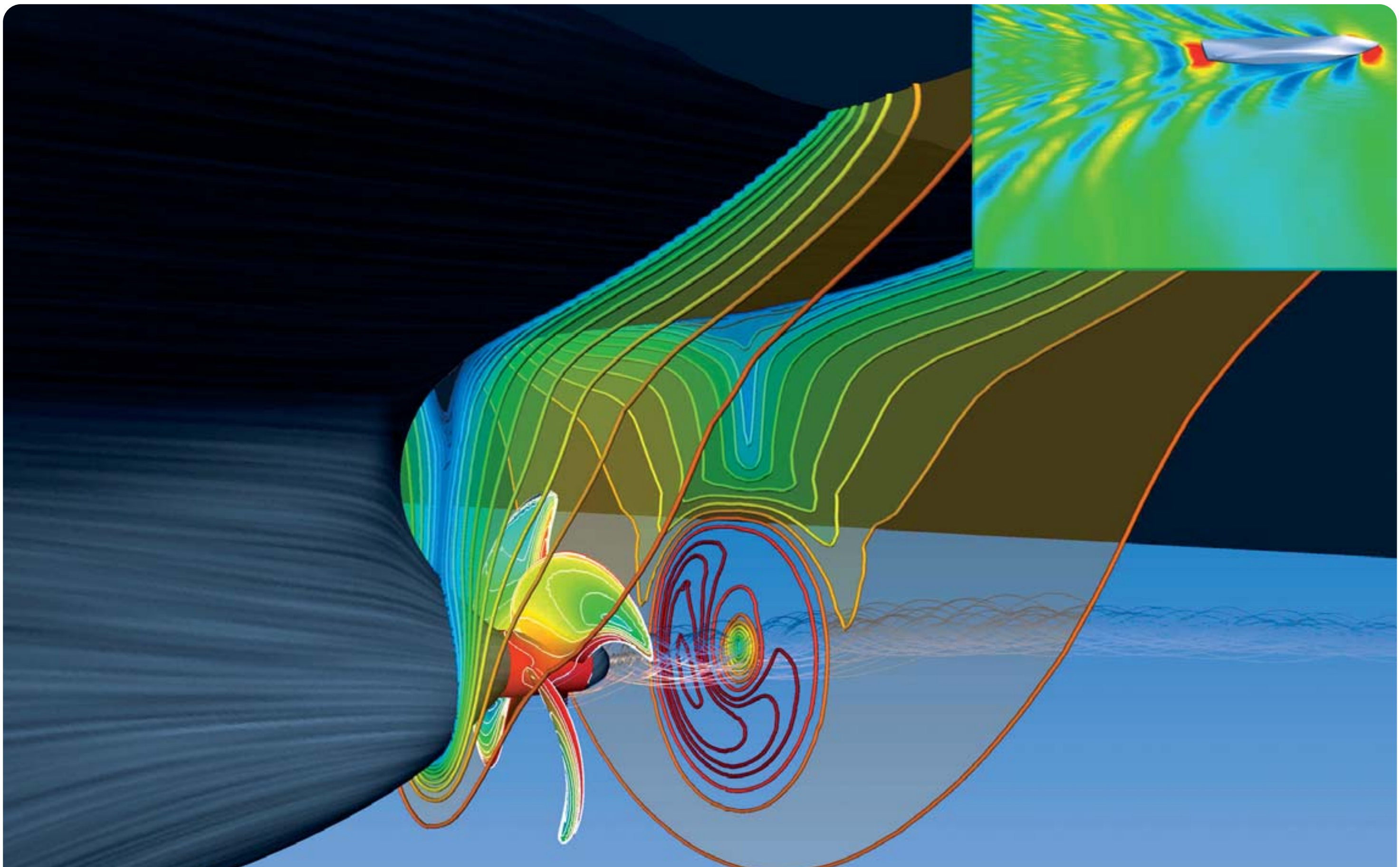
HSVA Newswave 2008/1

THE HAMBURG SHIP MODEL BASIN NEWSLETTER



VIRTUE delivers 1st complete numerical propulsion test

In this issue:

Dear Reader,

It is my pleasure to welcome you to the first issue of "Newswave" 2008. We have enjoyed sharing a very active year 2007 with our customers and after the very busy final quarter of 2007 we are looking forward to another busy first and second quarter of 2008.

It is well recognized that the main purpose of research, development and application is to improve and to advance our knowledge and our capabilities continuously. In ship hydrodynamics, at the moment the main objective is the improvement of ship performance, both from the safety and the environmental point of view. The ever increasing fuel costs call for additional optimum solutions concerning the design of more efficient vessels. There is a strong need for cost-effective solutions, new ship concepts to meet our clients requirements and the use of the available advances in computational fluid dynamics.

In this issue of "Newswave" we update you on some projects HSVA is involved in at the moment. We inform you about achievements concerning the complete numerical propulsion simulation and a procedure for manoeuvring predictions, both based on RANS calculations.

Take your time and have a look at the largest model ever tested in HYKAT, and be informed about latest developments concerning drilling operations in ice and new drill ship designs.

Over the year there will be several opportunities for you to meet our team. Among others, we will be present at the INEC Conference, at OMAE 2008 and finally at SMM 2008 here in Hamburg.

We all look forward to seeing you in Hamburg or elsewhere.

Juergen Friesch
Managing Director

Numerical propulsion test with rotating propeller

by Karl K.-Y. Chao

The performance prediction of the integral system "ship + propeller" is a central CFD application. HSVA's numerical towing tank is now able to perform a complete propulsion simulation including the rotating propeller for viscous free surface flow.

The main achievements of HSVA's CFD team within the EU projects EFFORT and VIRTUE have been reported in earlier issues of "Newswave". Earlier attempts to numerically model a propulsion test have used an iterative procedure accounting for the interaction between hull, rudder and propeller. The latter has been modelled using the body force concept. The predicted propeller thrust, torque, the number of revolution and the flow field agree well with the experiments. However, because the propeller is calculated based on a potential flow method, this practical approach does not account for viscosity effects on the blade pressure field and the resulting generation of tip and hub vortices, which are important features with respect to cavitation phenomena.

In the VIRTUE project HSVA has developed procedures for complete numerical propulsion simulation with rotating propeller. Successful computations and validation of the results for a database vessel are reported here. In the context of the project, flow field visualisations are performed by ZIB who used AMIRA© to produce the title images of the present issue of "Newswave".

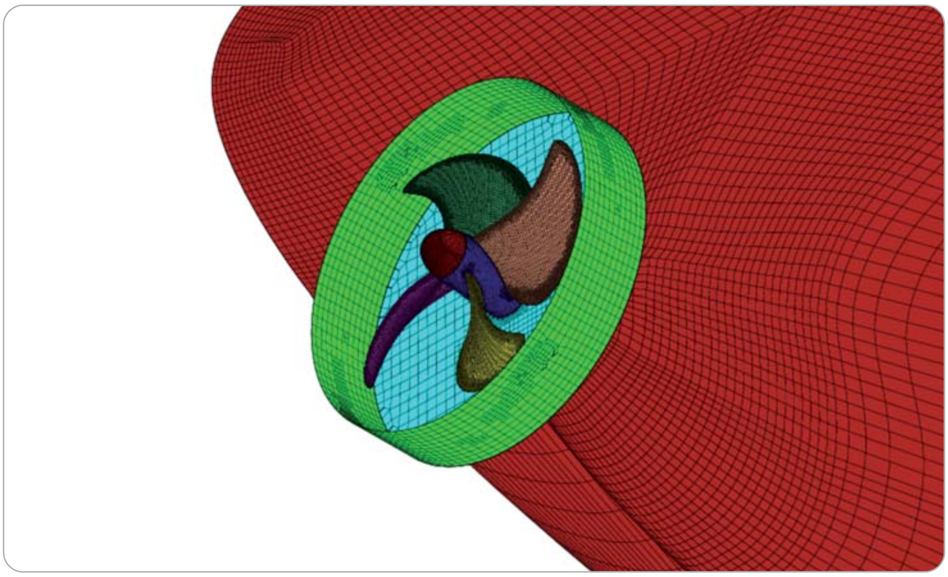


Fig. 1: Meshes on the hull, the propeller and at the sliding interfaces (front and mantel shown)

Approach

The complete numerical propulsion simulation may be briefly described by the keywords: viscous free surface flow, moving grid approach with the sliding interface technique for the rotating propeller.

The RANSE solver 'Comet' is used for the present study. A structured grid of the fixed 'ship block' for usual RANS/FS (Free Surface) computations was generated using the software packages ICEM-CFD, and an unstructured grid for the rotating propeller block was generated by HEXPRESS. Fig. 1 shows the meshes on the hull, the propeller, and portions of the sliding interfaces for the database vessel 'Hamburg Test Case' (HTC). The fineness and the good quality of the propeller meshes around the leading and trailing edge are remarkable. Because of the unstructured grid of the propeller block, the explicit cell connectivity has to be carefully established.

The classic RNG k-ε turbulence model, which has been proven to be robust for viscous free surface flow computations, is used. The Euler implicit scheme is employed for time integration in the transient calculations.

By means of the sliding interface technique the ship block and the propeller block are dynamically connected as the grid of the propeller block moves. The key issue thereby is, that the computed velocity and pressure in the adjacent interface cells of the fixed and the rotating blocks must be consistent. Consequently, a much stricter convergence tolerance is needed, to ensure that the velocity-pressure correction is appropriately performed everywhere in each time step.

RANS free surface computations with rotating propeller

HSVA has made the results of model and full scale flow measurements of 6 ships available in the EFFORT project for the verification and validation of CFD codes. One of the database vessels, the 'Hamburg Test Case (HTC)', was chosen to validate the viscous free surface computations within the work package 'The Virtual Towing Tank' of the VIRTUE project, because of the detailed experimental data including wave patterns, flow fields without and with propeller, etc. HSVA's prediction of the resistance including dynamic trim and sinkage for this ship model was considered top ranked in an internal workshop of VIRTUE. The validation of the CFD methods continues for complete propulsion simulation of this ship model with rotating propeller for **Fn=0.238** at the corresponding full scale draft of T_F=9.2 m and T_A=10.3 m.

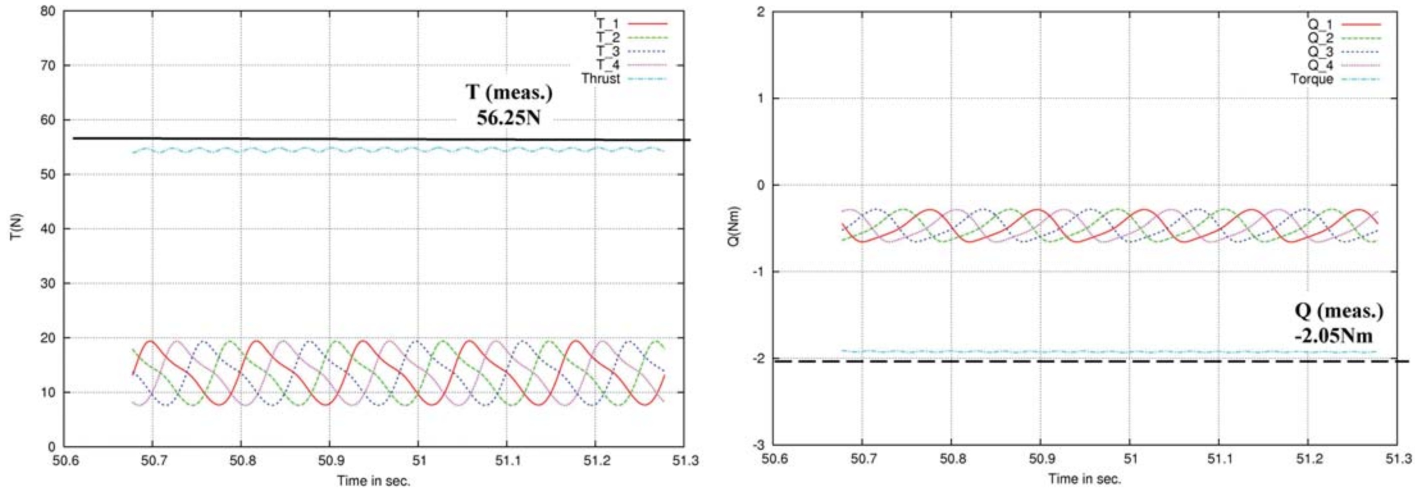
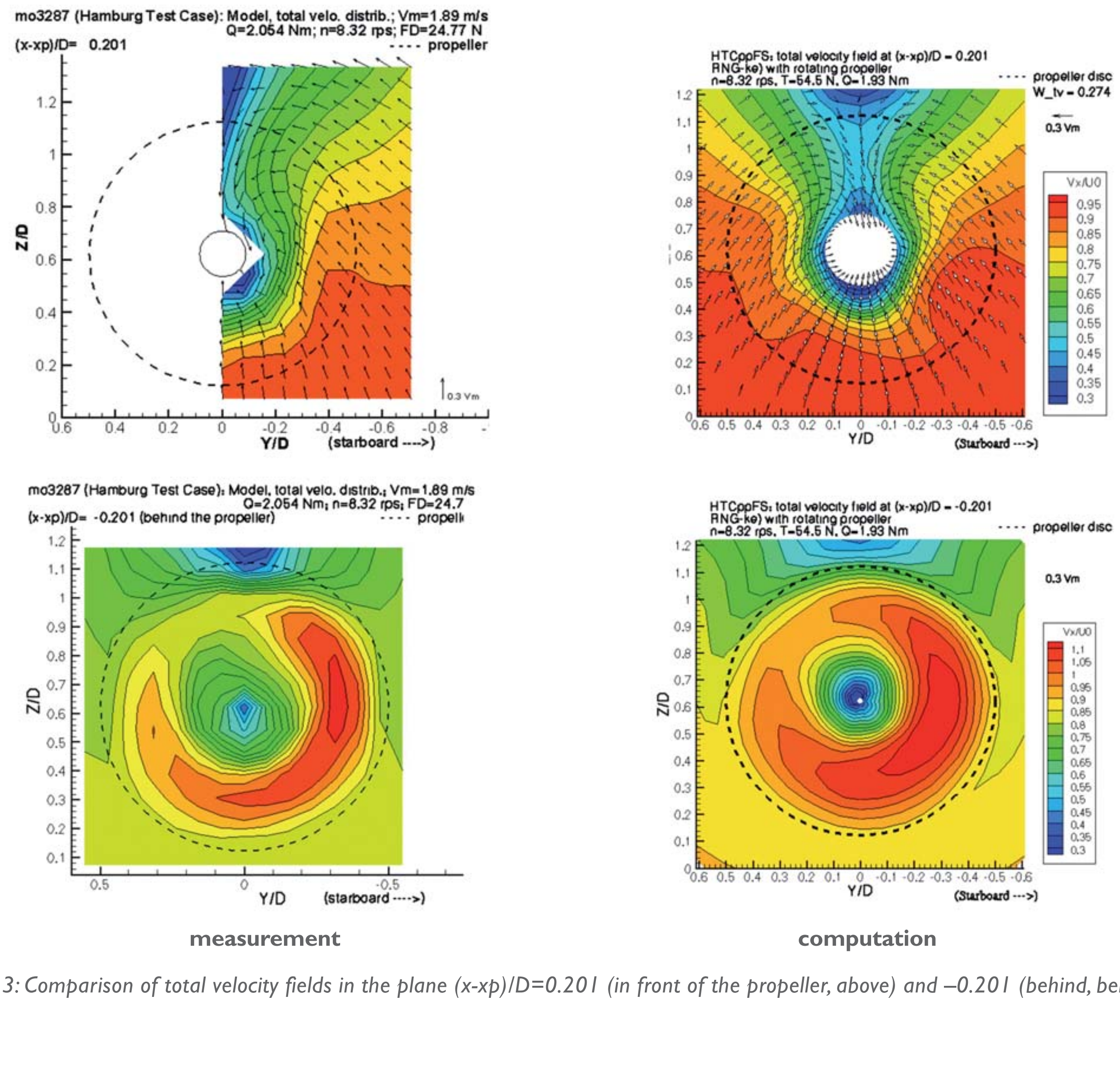


Fig. 2: Time history of the computed thrust and torque for HTC propeller



measurement **computation**

Fig. 3: Comparison of total velocity fields in the plane (x-xp)/D=0.201 (in front of the propeller, above) and –0.201 (behind, below)

The simulation began with propeller fixed. After a nearly steady state of the free surface formation has been reached, the propeller was released to rotate with a preset speed of 8.32 rps (revolution per second) which was the value, used during the flow field measurements. Because of the strict convergence criterion, the CPU time is very long.

Validation of the CFD results

The computed wave patterns for HTC without propeller have been compared with the measurements. Good agreement was found and has been reported in HSVA "Newswave" 2007/1. The implementation of the rotating propeller shows an adjustment of the wave patterns only in the narrow region behind the transom caused by the propeller, as expected.

The time history of the computed thrust and torque of each blade for the last 5 turns are shown in Fig. 2. The cyclic behaviour of propeller forces in behind condition is to be expected. Accordingly, the total propeller thrust and torque reveal slight fluctuations of about 0.75 %, which is realistic. The mean values of the computed propeller thrust and torque amount to 54.5 N and 1.93 Nm, respectively. These results deviate from the measured thrust (56.25 N) and torque (2.05 Nm) by 3.1 % and 5.8 %, respectively.

Another good measure of the validation of the CFD method for propulsion simulation is, to compare the predicted flow field with the experiments. Fig. 3 shows the measured and the computed total velocity fields in two planes. The agreement in the plane in front of the propeller is remarkable. The computed iso-tachs in the plane behind the propeller have the same shape compared to the measurement, but the axial velocity component is over-predicted by 5 to 10 %.

The computed hydrodynamic pressure distributions are shown in Fig.4 for angular positions of the key blade at –15 degree (port), 0 degree (upright) and 15 degree (starboard), respectively. These results have been expected. We know from practice that cavitation on the suction side of propeller blades of a right-handed, single screw ship propeller starts at port side. The cavitation extent increases toward the top position and has its maximum at approximately 15 degree starboard. The computed blade pressure distributions shown in Fig. 4 reflect the reality.

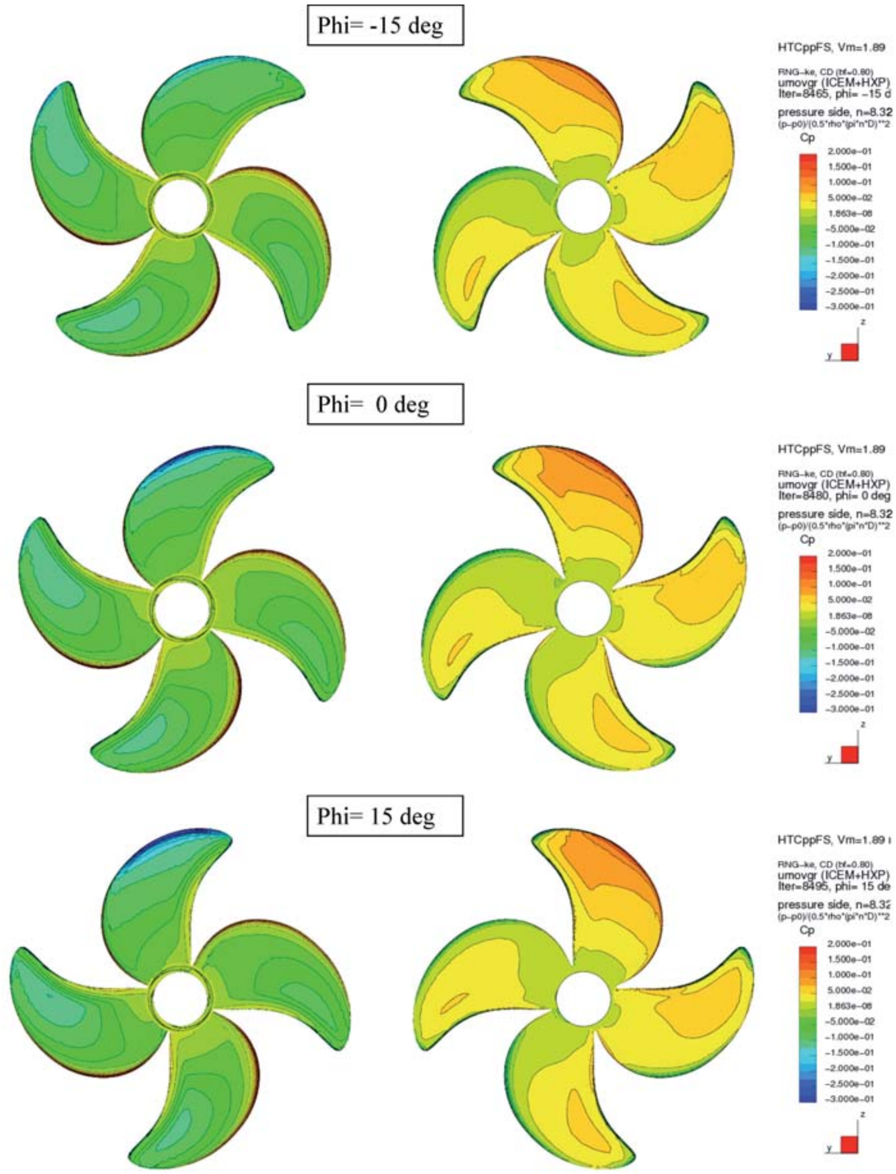


Fig. 4: Computed hydrodynamic blade pressure distributions of the HTC propeller: suction side (left) and pressure side (right)

Future work

HSVA has made full scale cavitation observation for several ships in the past. For further development and validation of the CFD methods, full scale propulsion simulation with rotating propeller for these ships should be carried out, not only with respect to performance prediction, but also to find out the correlation between computed pressure fields and the observed cavitation phenomenon.

Extending HSVA's Hull Form Design Capabilities

by Henning Grashorn

HSVA has extended its hull form design capabilities by purchasing the FRIENDSHIP-Framework CAE environment. Having successfully performed several commercial and research projects together with FRIENDSHIP SYSTEMS, we had the opportunity to examine the possibilities of this software in a number of test cases in the past.

Main feature is the sophisticated hull form variation via fully or partially parametric modelling and the embedded optimisation strategies. This allows for the evaluation of a multitude of automatically generated hull forms by potential flow calculations, gaining the optimum parameter combinations for the form modification through sophisticated algorithms. HSVA's free surface potential flow code nu-SHALLO is directly linked to the framework.

The use of the FRIENDSHIP-Framework is intended as an additional service within the usual hull form design and optimisation process. It will allow for a wider exploration of possible hull forms for commercial projects and also for HSVA's own hull form research.

As the tool for the evaluation is a potential flow code with all its possibilities and limitations, the use of the FRIENDSHIP-Framework will focus on the reduction of the wave making resistance only. The effect of hull form modifications on the viscous effects and on the propulsion still has to be judged by our experienced staff. During this process, HSVA's hull form design experience is applied during all stages of the design and the optimisation process. This in particular is essential for the final hull form, when the results of the optimisation are supplemented by the experience of our hull form designers.

We are looking forward to working with this promising software and welcome any request form our customers to use it in actual projects.

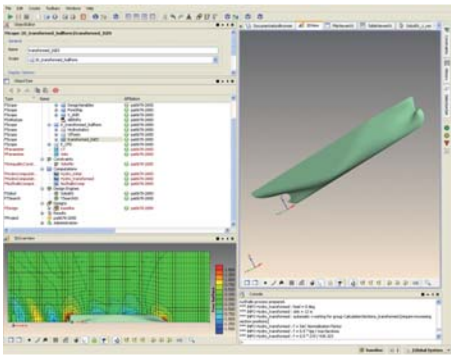


Fig. 1: Graphical User Interface of the FRIENDSHIP-Framework CAE Environment

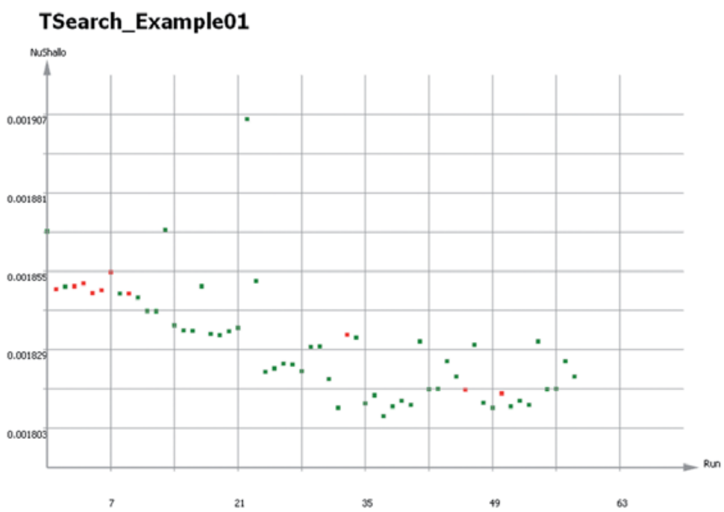


Fig. 2: Calculated Residual Resistance during an Optimisation Process

The Largest Model Ever Tested in HYKAT

by Johannes Pieper and Christian Johannsen

A challenging task for the HYKAT Crew: A gap of only a few centimeters was left when manoeuvring the huge model into the HYKAT building. The 13 meter long model of a twin screw vessel is the largest ship model ever installed in the HYKAT cavitation tunnel. The photograph shows the long cutout in the fore body, which was necessary to make the model penetrate four and a half meters into the nozzle region in front of the HYKAT test section.

But why so big? The huge ship model resulted from the large propeller model diameter as it is consequently realized at HSVA. A big propeller model – about 230 mm in the present case – has considerable advantages: It allows detailed visual observation of the individual cavitation phenomena in the cavitation tunnel. This is crucial for a reliable judgement of the erosion risk. Together with the high tunnel water speed usual in HYKAT, it also leads to a high Reynolds Number and therefore less scale effects. All together ensures best reliability of the prediction, as customers have come to expect from HSVA.

Despite the extraordinary size, the test series was successfully completed on schedule – revealing encouraging results for the customer.

Manoeuvring Prediction

by Andrés Cura Hochbaum and Mathias Vogt

After the approval of the "Standards of Ship Manoeuvrability" by the IMO in December 2002 and due to increasing awareness in safety and – not least – aiming at more profitable ship operation, manoeuvring tasks have become more important in recent years.

A classical procedure for predicting the manoeuvring behaviour of a new ship design, consists in performing manoeuvring tests in a towing tank or basin with a captive ship model. The tests are often performed with a Planar Motion Mechanism (PMM) or with a Computerized Planar Motion Carriage (CPMC), which has independent drives for the different motion directions or axes. From the measured time histories of the hydrodynamic forces and moments acting on the model during properly selected forced motions, manoeuvring derivatives are determined. Once, all the derivatives have been determined for a considered ship, it is straight forward to simulate any desired rudder manoeuvre for this ship. For this purpose, the motion equations of the ship in 3 or 4 degrees of freedom are integrated in time, using the manoeuvring derivatives to approximate the hydrodynamic forces and moments in the motion equations. The quality of this kind of simulations is accepted to be high.

A very promising alternative to the procedure for manoeuvring prediction mentioned above, consists in performing Reynolds-Averaged Navier-Stokes (RANS) simulations of the flow around the ship, carrying out prescribed motions resembling CPMC tests. The predicted time histories of the forces and moments acting on the ship during the simulation, can be used to determine manoeuvring derivatives in the same way, as from measured time histories.

The propeller effect is taken into account by means of a body force model which approximates the forces and moments acting on the propeller. It yields the three force components of an equivalent, time-averaged force distribution in each control volume inside of the propeller region, which replaces the propeller during the simulations. Fig. 1 shows the stern arrangement of a single screw ship with the rudder deflected 10 degree to starboard.

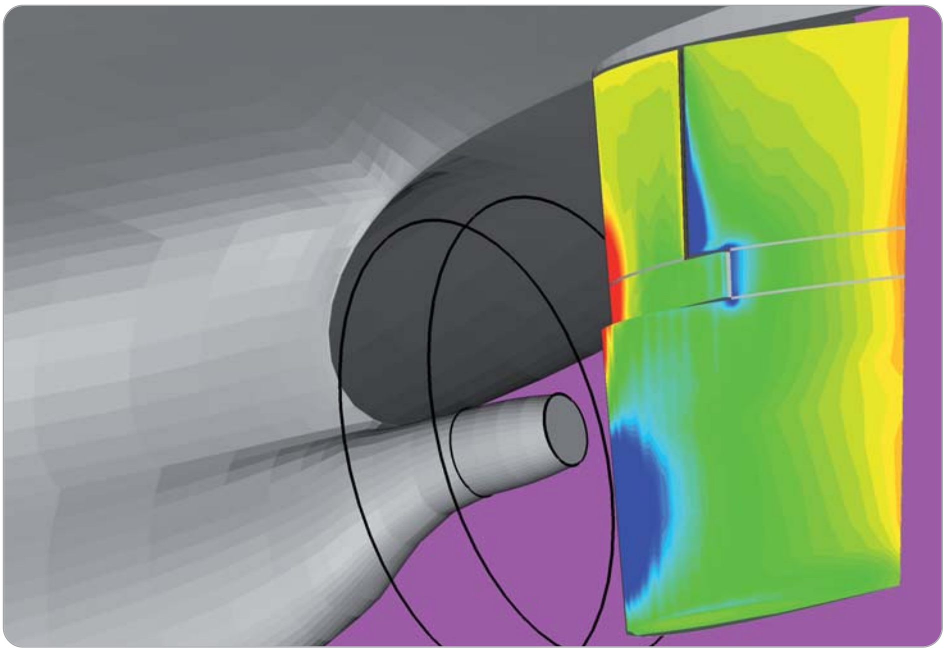


Fig. 1: Stern arrangement of the virtual ship model and predicted pressure on the rudder

As can be seen, the pressure field on the rudder is influenced by the effect of the propeller, rotating to the right over the top. Pronounced negative pressure regions are depicted in blue, while positive pressure regions are in red. Black circles indicate the body force region.

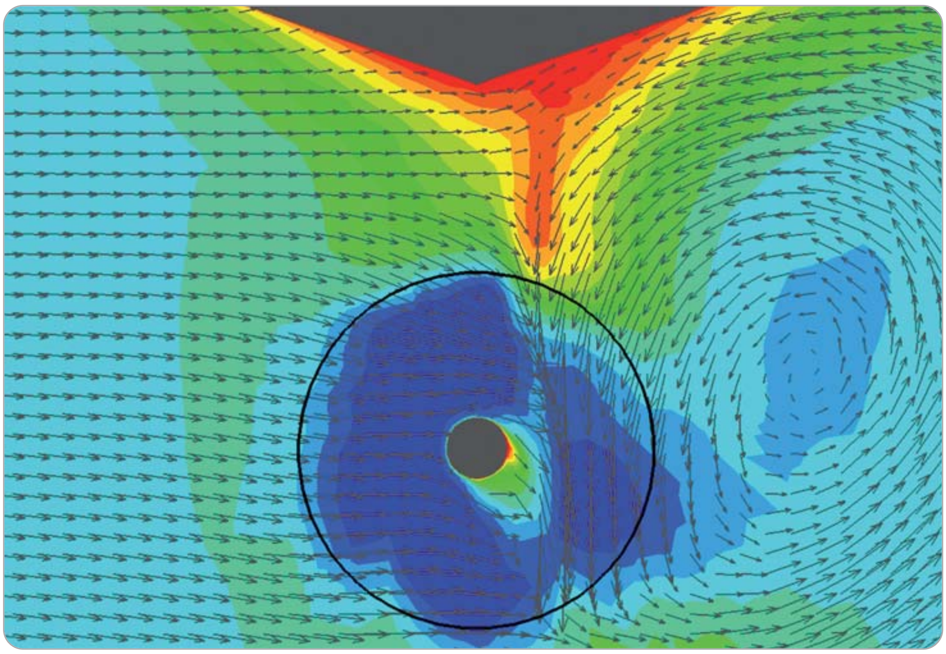


Fig. 2: Snapshot of the velocity field behind the propeller during a combined sway-yaw test

Fig. 2 shows the velocity distribution just behind the propeller plane, during a simulated combined sway-yaw test at a certain time point, when the ship is turning to starboard. A strong vortex on the starboard side and the almost undisturbed flow on the port side interact with the velocity field induced by the body forces.

The hydrodynamic forces and moments acting on the ship are obtained by integrating the pressure and shear stresses on the hull and appendages. The agreement of the predicted time histories during simulated pure surge, pure sway, pure yaw, as well as combined sway-yaw tests with measured data is absolutely encouraging, as can be seen in Fig. 3.

The set of hydrodynamic coefficients obtained from the virtual CPMC tests is used to simulate standard rudder manoeuvres according to IMO. The main results for the 10°/10° zigzag test are compared with those obtained during free model tests. Fig. 4 shows the time histories of the heading angle Ψ, the transverse deviation y and the rudder angle □versus time. The agreement is quite satisfactory. The 1st and 2nd overshoot angles of Ψ and the amplitude of y agree fairly well with the measurements.

Any other rudder manoeuvre, e.g. turning circles tests and spiral test, which are important for estimating the manoeuvring capability of a ship can be predicted. The results of the simulated spiral test, for instance, showed that the vessel considered in the present case is unstable in yaw.

In short, usual hydrodynamic coefficients can be determined from virtual CPMC tests, simulated with a RANS code instead of real, tests with enough accuracy to get useful information about the manoeuvrability of a vessel. Depending on how sophisticated the coefficient-based mathematical model is, it takes more or less time to get all needed derivatives. A rather simple model can already help to clear important aspects like course or yaw stability.

The present method represents a very useful alternative for predicting the ship manoeuvrability and for comparing different design variants in the early design stage.

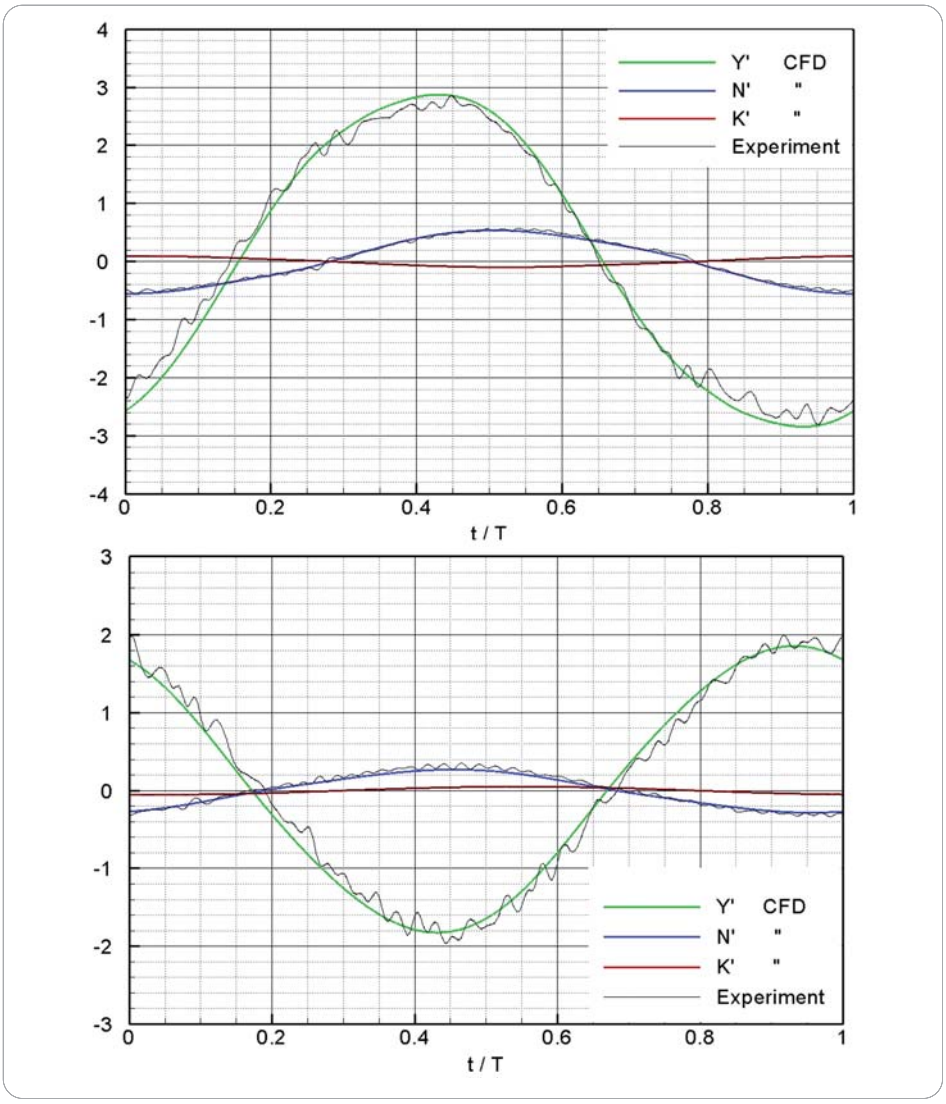


Fig. 3: Computed and measured non-dimensional side force and moments during one period of a pure sway test (top) and a combined sway-yaw-sway test (bottom)

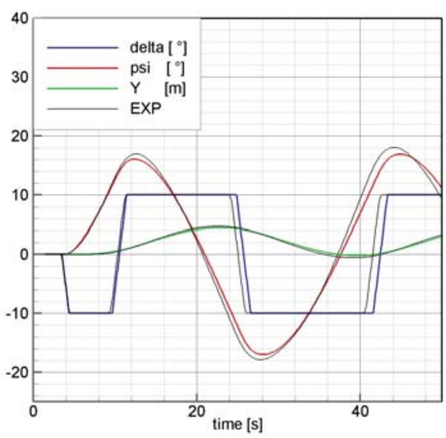


Fig. 4: 10°/10° zigzag manoeuvre simulated with derivatives from virtual CPMC tests compared with results of free manoeuvring model test

Exploring the ULSTEIN X-BOW® Concept

by Hilmar Klug

HSVA was contracted by Ulstein Design AS to optimise the hull lines design for several new ship types, featuring the ULSTEIN X-BOW® and to perform related computations and model tests in calm water and in waves.

One highlight has been the model tests for the seismic research vessel ULSTEIN SX120. For this ship the building specification defined the need to fulfill certain speed and pull force levels, not only in calm water but in head waves too. Consequently ship powering tests and pull force tests at three different speeds have been performed in calm water and in two seaways.

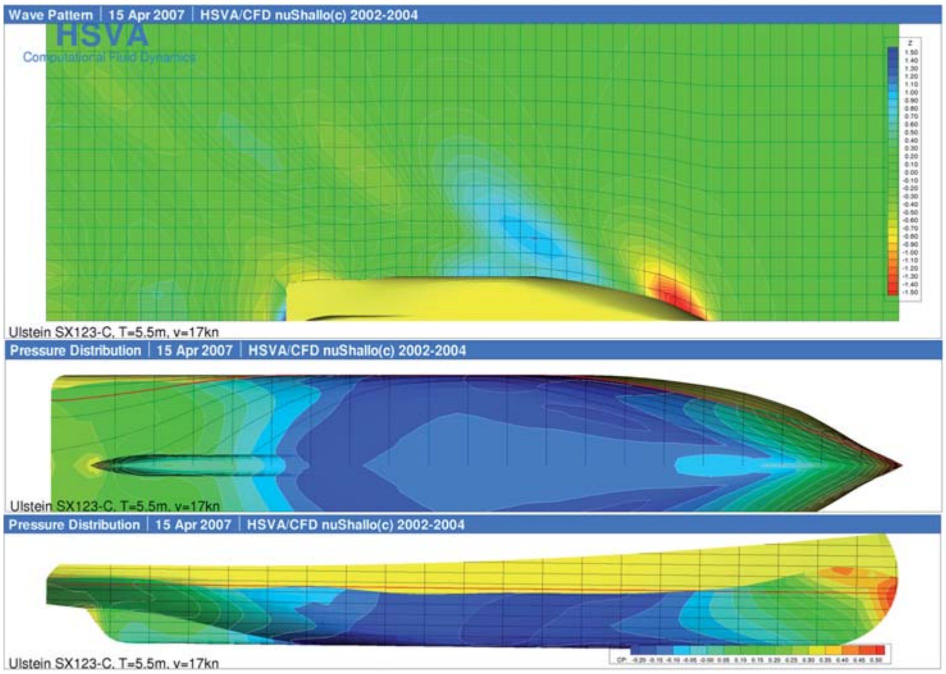
Another highlight has been the model test campaign for the stand-by and rescue vessel ULSTEIN SX123, because the building specification defined minimum speeds in head waves and following waves. HSVA performed the corresponding powering tests with a free running model, also allowing the judgment of the vessel's behaviour in waves (e.g. surfing in following seas).

The tests for the offshore construction vessel ULSTEIN SX121 proved the necessity of moonpool covers, since the absence of them lead to a significant increase in the resistance and to dramatic porpoising of the whole vessel.

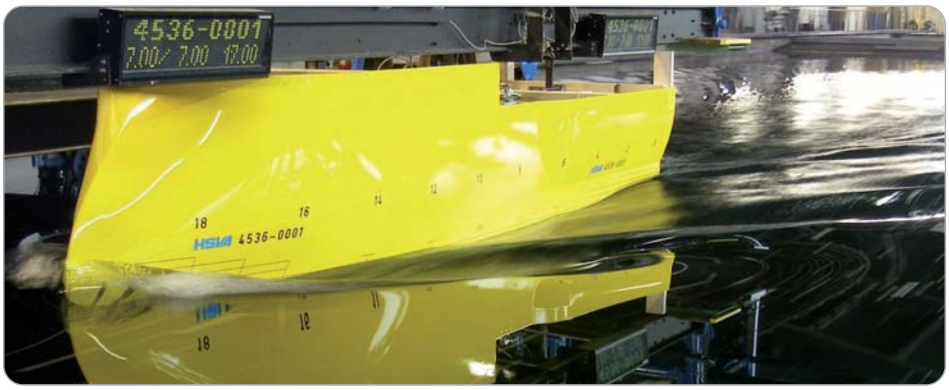
The latest model test series being performed is for a 1200 TEU container vessel with ULSTEIN X-BOW® and a bulbous bow. The results of the powering tests in calm water and head waves are currently being analysed.

Artist impression of ULSTEIN SX121

Artist impression of ULSTEIN SX123



Potential flow CFD for ULSTEIN SX123



Powering tests for ULSTEIN SX120

Design Refinement for a High-Speed Twin Screw Vessel

by John Richards and Hans-Uwe Schnoor

HSVA was contracted by a European Consortium to further refine the design of a high-speed twin screw vessel. The task included modifications to the bulbous bow and also the optimisation of the shaft brackets and rudders, with respect to powering and cavitation performance. Suitable numerical calculation methods (CFD) were employed for the individual optimisation cases, as a support to the design work.

Although, the overall performance of the existing vessel was already acceptable, it was decided that the bow wave development at intermediate speeds still needed some attention. Therefore, a bulbous bow optimisation was proposed, and the emphasis was put on the bow wave and spray development situation at intermediate speeds up to about Fn = 0.25. Of course, any reduction in required power that could accompany the actual target of spray reduction, would be looked upon favourably.

As the shipbuilding project was already at a very advanced stage, the area of the bow that could be attended to was quite limited, i.e. forward of about station 18.5. This helped to increase the challenge of the task.

The potential flow code is a good tool for predicting and in particular for comparing wave generation for different hull form variants. However, it is not suited for handling wave breaking or spray phenomena. Nonetheless, with proper interpretation the results can also be useful for this problem. With the help of HSVA's potential flow code nu-SHALLO, the initial lines and further bulb variants were investigated. Different steps included the consideration of fuller and higher bulbs and also a lengthening of the design waterline by locally shifting the stem forward. All calculations were performed at several speeds, in order to make sure from the beginning that a modification bringing an improvement at lower speeds, would not be detrimental at high-speeds.

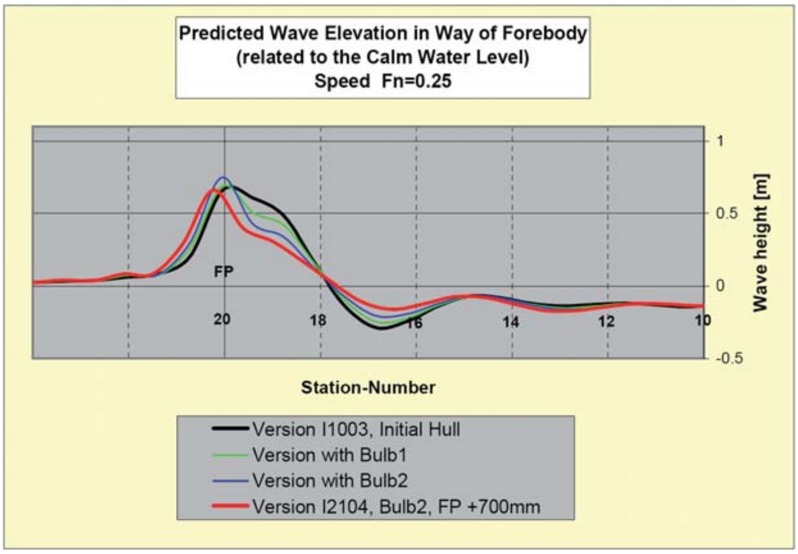


Fig. 1: Predicted Wave Elevation in Forebody

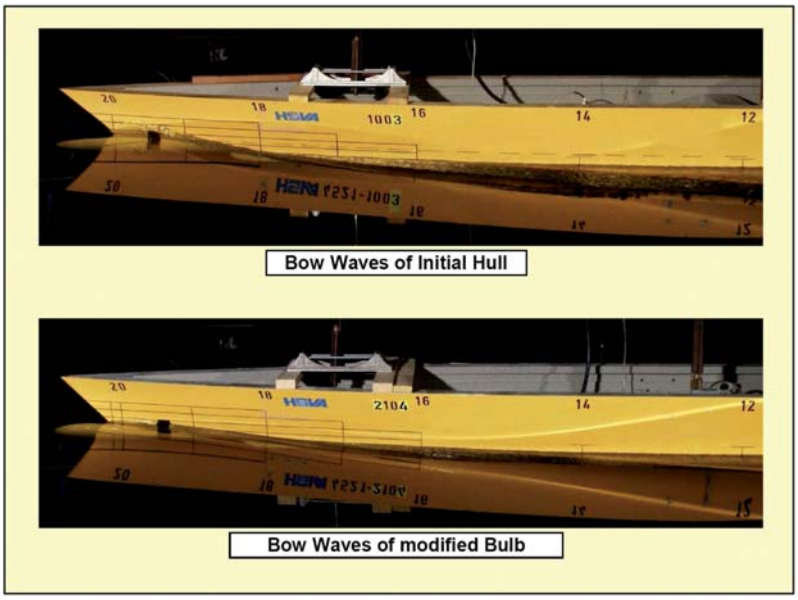


Fig. 2: Bow Waves of Initial Hull and of modified Bulb

The calculated bow wave heights are plotted in Fig. 1 where it can be seen, that between the initial form Version I1003 and the finally chosen Version I2104, both the height of the bow wave and the depth of the first wave trough at station 17 were reduced. It was concluded that this improvement could be taken to indicate, that the actual problem of spray development would be reduced also. The verification and quantification of the vessel's performance following the modification, was as usual a task for model tests in HSVA's large towing tank. In the photographs in Fig. 2, a before/after comparison of the bow wave pattern at Fn = 0.25 is shown. A similar improvement was observed over the entire speed range from Fn = 0.18 upwards. An attractive side effect is, that over the same speed range the bow wave reduction, together with the appendages modification, was coupled with a power gain of 6% to 7%.

This exercise is an example of how modern CFD tools in the right hands can be very useful, also for solving 'off-design' problems.

Drilling in Ice

by Karl-Heinz Rupp

Introduction

The Arctic Ocean remains the only major sub-basin of the world's oceans that has only occasionally been sampled by deep sea drilling. Today, the properties of the Arctic Ocean are being focussed upon by both researchers and commercial oil and gas drilling companies. Research core drilling is of great importance for the researchers because it allows them to increase their knowledge about that large ice covered area. And of course the present high prices for energy make it profitable to explore for reserves and to produce energy even in the ice covered waters of the High North.

In 2000, the Alfred-Wegener-Institut (AWI) in Bremerhaven Germany (www.awi-bremerhaven.de) contracted the Hamburgische-Schiffbau Versuchsanstalt (HSVA) to carry out a draft design study for an Arctic drilling research vessel. The project was entitled "Aurora Borealis".

Drilling operations in ice have already been carried out at the ice border with "open water drill ships", mainly with the support of icebreakers (e.g. *JOIDES Resolution with Maersk Master*).

Some drill ships are reinforced for operation in ice, but this reinforcement is limited to the strengthening of the ship structure and does not include the propulsion and operational outfitting. An ice-breaking drill ship should be capable of keeping its position so that the drilling operation can be continued, also when it is surrounded by drifting ice.

Review

Some difficulties which a drill ship in ice will experience have already been described in 1983 (Dynamic Response of a Moored Drill ship to an Advancing Ice Cover, T. Kotras, A. Baird, E. Corona, POAC 83, Volume 3, page 433, Helsinki, Finland, 1983):

"The ability of a vessel to stay within a prescribed operational radius is greatly enhanced when impacting ice in a head-on condition. Beam-on collisions cause excursions from two to five times larger as those occurring head-on.

The ability of a drill ship to quickly yaw into a heading in-line with the advancing ice is directly related to the maximum excursion seen.

In the Bering Sea, an unassisted drill ship may not be capable of year round operation during the heavy ice periods, ...".

In 1980, a drill-platform from GULF CANADA (Conical Drilling Unit) was tested in ice by HSVA. It was found that the rig could operate in an ice thickness up to about one meter. This platform, the KULLUK, was positioned with a system of anchors. The shape of the platform was circular in the plan view and the section was similar to an asymmetrical sandglass. The turret was placed in the centre of this floating island. This platform was not suitable for being moved over long distances at sea.

In the last decade an improvement in manoeuvrability and ice breaking performance has been made by applying azimuth propulsors. In the meantime, several ice going and ice breaking vessels, e.g. icebreakers, supply vessels, tankers and multi-purpose container vessels are equipped with this type of propulsion system.

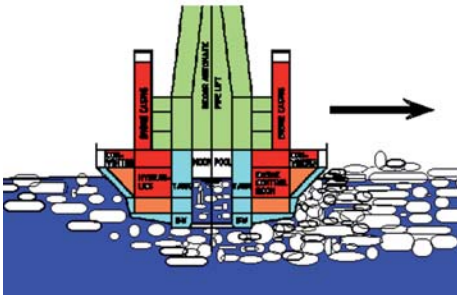
Technical Development

When ice is drifting it is changing in both, speed and direction. Furthermore, the ice conditions vary from easy to heavy (e.g. ice ridges). The drill ship must be able to keep position within a very narrow margin. All of these requirements, as well as the technological developments described above, have been taken into consideration for HSVA's concept design for the "Aurora Borealis".

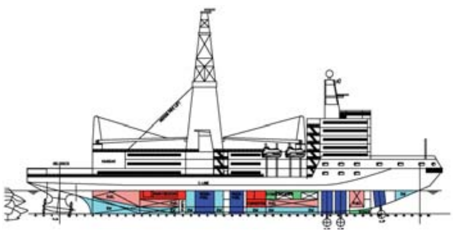
The technical advantages are:

- Low ice resistance of the drill ship at both bow and stern. This was achieved with an optimized ice icebreaking hull shape, similar to that of an icebreaker.
- High ability to turn the vessel in order to follow changes in the ice drift. This was achieved by implementing a strong slope to the side of the vessel (see cross sections). This hull shape allows the vessel to break ice over the entire ship length. In order to break the ice the azimuth propulsors deliver the required thrust for turning the drill ship.
- The vessel is able to operate in ice without the assistance of an icebreaker up to the point where the design limits are reached. With icebreaker assistance the operational limits of the drilling vessel can be extended.

The HSVA design study for AURORA BOREALIS has been disclosed in several publications and presentations since 2001. The following sketches are from: European Polar Board (EPB), AURORA BOREALIS "A long term European Science Perspective for Deep Arctic Ocean Research 2006-2016", June 2004.



The cross section shows the sloped side of the drill ship with ice accumulated during turning at zero or low ice drift velocity



Side view of AURORA BOREALIS with two moon-pools (as designed by HSVA)

Logistics in ice management

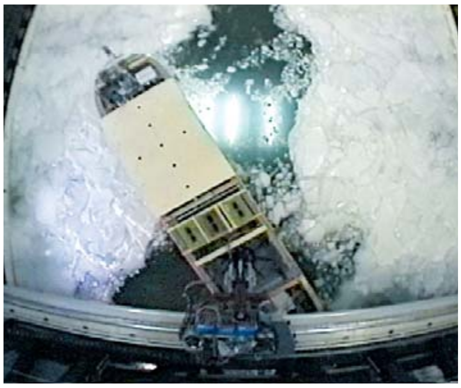
In addition to the technical improvements, the logistics in ice management are of great importance. The use of all kinds of satellite and weather data are the first step, for obtaining information about the ice conditions and the ice drift speed and direction over a large area. Closer to the drill ship the ice drift speed and direction can be detected by sensors. The ice thickness can be measured with electro magnetic ice thickness measurement devices and together with visual ice observations, the severe ice conditions can be detected and traced, and the possible danger to the drill ship can be calculated.

One example of excellent ice management is the core drilling research work of Vidar Viking in 2004 close to the North Pole. Vidar Viking was built as an ice breaking supply vessel and was equipped with a drilling rig. The vessel alone is not able to keep position during drilling in the Arctic ice, although it is equipped with a dynamic positioning system (DP) for ice free waters. Manual DP in ice was only possible because the Russian nuclear icebreaker SOWJETSKI SOJUS and the Swedish Icebreaker ODEN broke the drifting ice into small pieces (well managed ice).

Tests with a moored drilling vessel in drifting ice

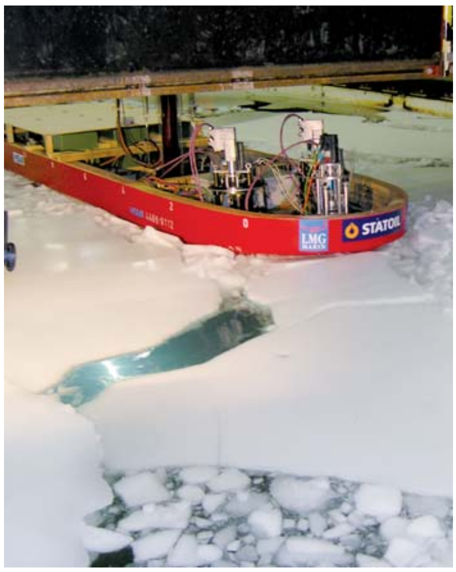
HSVA tested several drilling and production and storage vessels in managed ice and in well managed ice. In these tests the ice drift hit the vessel under different angles. Such "oblique towing tests" document large deviations in the vessel's position and in the corresponding loads on the moorings. During the last few years HSVA has designed and/or optimized several of these vessels and through this work has gained a tremendous amount of experience with such highly complex systems in ice.

As an example: From 2006 until 2008, HSVA carried out several ice model test series for a turret moored drilling vessel with thrusters assistance for the Norwegian engineering office LMG Marin in Bergen and STATOIL (now StatoilHydro). The tests were successfully carried out in level ice of up to 2.0 m, in ice ridges and in ice rubble fields. The main target of the investigation was to develop a concept for enabling the vessel to follow the ice drift change in order to keep the vessel within the range of the lowest ice resistance. The following pictures give an overview of several ice scenarios which have been tested:

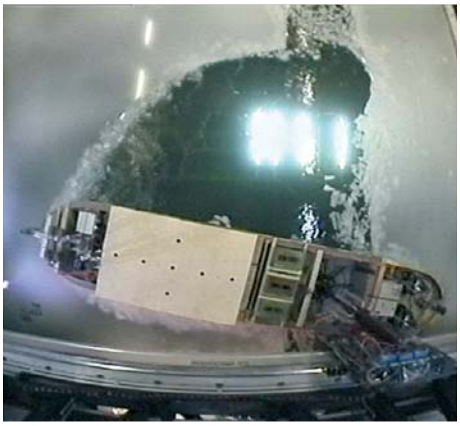


Clearing ice out of a rubble field in order to rotate the vessel

Track behind the drill ship after an ice drift course change of 20°



Tests in broken irregular thick ice



The vessel is rotated around the centre of the turret using the thrust of the azimuth propulsors. The sloped sides break the ice by bending

The propeller wash is a useful tool for breaking ice or to wash ice away from the vessel

A Unique Side Wave Generator System for HSVA's Large Towing Tank

In January 2006, HSVA started a research project, concerning the development of a side wave generator system for the large towing tank. The scope of the research covers the following topics:

- Feasibility study of a side wave generator system for the large towing tank
- Study of wave absorber systems
- Design, build and install a demonstrator of the side wave generator in the towing tank

The research, which is partially supported by the Free and Hanseatic City of Hamburg shall demonstrate, that the designed system is capable of generating oblique waves in a towing tank.

Upon successful demonstration tests of the design at the end of the project in December 2009, it is planned to install side wave generators over a length of more than 120 m. This will increase the capabilities for seakeeping tests at HSVA dramatically.

SMM 2008 Congress Center Hamburg

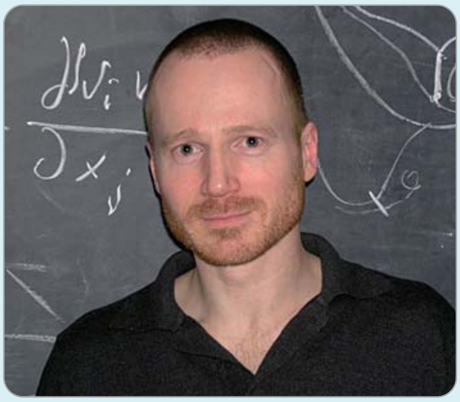
From 23th till 26th September 2008 the Shipbuilding, Machinery & Marine technology international trade fair (SMM), the most important exhibition in Europe, takes place at the Hamburg Congress Centre.

With 45,000 visitors from all over the world and approximately 1,600 exhibitors, the SMM Hamburg is one of the leading international trade fairs for the maritime sector.

SMM 2008 will once more be presenting a wide range of innovations to meet the ever rising standards, for more competitive ships and to exchange new technologies and products for the marine business.

HSVA is looking forward to seeing you at their booth Nos. 260 and 261 in hall B4, to present their actual research projects as well as recent developments.

Member of staff



Mathias Vogt joined HSVA in 1999 as a project manager in the CFD department, where he started working on the development and application of numerical tools. Among other challenging tasks he greatly contributed to the extension of the RANS code Neptun to account for seaway and ship motions.

Mr. Vogt transferred to the Seakeeping and Manoeuvring department in 2001 working on manoeuvring related problems, performing model tests using the Computerized Planar Motion Carriage, as well as using traditional and RANS methods, in commercial and research projects. In 2004 he was appointed as deputy head of the Seakeeping and Manoeuvring department.

Mathias Vogt who was born in Sweden, graduated as a naval architect from the Royal Institute of Technology in Stockholm in 1994, and moved to Gothenburg to work for Professor Lars Larsson developing CFD methods for free surface viscous fluid flow problems at Chalmers University of Technology. In 1998 he received his licentiate degree.

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