

*I.A. Chicherin.* **RANS Calculation for Propeller.** Pp. 4–27.

RANS method for viscous-flow simulation around a propeller is presented. Governing equations are written in a noninertial coordinate system fixed on a rotating propeller. Method for grid generation around propeller is developed. Test calculations for DTMB Propeller 4119 (designed in the 1960's) and for a modern propeller (skew is 20°) are in a good agreement with experiment.

*D.M. Denisikhina, M.P. Lobachev, N.A. Ovchinnikov, A.E. Taranov.* **The employment of programming packet STAR-CD for calculating viscous flow pattern in a water jet channel.** Pp. 28–41.

In this work the flow-field analysis of high-speed boat with water jet with the aid of a numerical method based on the solution of Reynold's equations was made. The possibility of employing this method for optimization of the form of the water jet channel is shown. Calculations in the program complex Star-CD were carried out for the case of the full-scale boat with a length of 7.3 m moving at a velocity of 30 knot. Primary attention in this work was paid to the prediction of flow characteristics in jet's channel.

The executed calculations showed that when considering the jet channel flow a simplification of the problem formulation is possible due to exception from the examination the longitudinal undercuts on the boat hull.

As a result of the executed calculations it was established that the flow separation is observed on the upper surface of jet channel. After the form of this surface was changed the flow separation was practically eliminated, that made possible to decrease the non uniformity of the longitudinal velocity field in the section before impeller from 0.73 to 0.44 of boat motion speed. Thus, it was shown that employing numerical calculations for optimization of the water jet channel form makes it possible even on the design stage to forecast and to remove the unfavorable effects, which can appear as a result of unsuccessful channel form adoption.

*A.Yu. Yakovlev.* **High order boundary equation method to flow computation of propulsion devices.** Pp. 42–54.

The new high order boundary equation method is presented. The method is based on solving the 2<sup>nd</sup> order Fredholm integral equation of sources strength on the body surface. The vortexes distribution on body surface and vortex sheet behind the body is utilized additionally in case of flow with lifting force appearance. The main feature of the method is that the Halerkin method with special system of basic functions has been applied to solve the equation. The present approach allows to receive the following advantages: the discharge conservation is satisfied on each panel, the body surface has real geometry and doesn't require approximation during computation, velocity will be smoothly calculated in arbitrary point on the body surfaces. The accuracy of the calculation method has been verified by several computations of classical flow problems, calculations of rudder in the propeller wake and propeller characteristics.

*A.Yu. Yakovlev.* **Computation of vortex sheets alteration in the propeller wake.** Pp. 55–68.

The method of vortex sheets form calculation in uniform inflow behind the propeller blades is presented in the paper. The vortex sheets form definition is a nonlinear hydrodynamic problem, which is solved by iteration method. The method allows to simulate numerically vortex sheet roll-up process and to take into account interaction between sheets leaving different blades within the frame work of inviscid fluid. Comparison of calculation results and experimental data has shown a good accuracy of the presented calculation method.

Exact definition of the vortex sheets form is important to calculate velocity field in the propeller wake and estimate unsteady forces acting on propulsion device components due to interaction with the propeller wake.

*V.A. Boushkovsky, F.I. Gabertchettel, S.V. Kaprantsev, A.V. Pustoshny, I.G. Frolova, Veikonheimo Tomi.* **Development of the propeller series for AZIPOD compact.** Pp. 69–81.

In 1997 ABB started to develop and promote series of AZIPOD COMPACT thrusters intended for relatively small ships such as yachts, ferries etc.

ABB have been constantly improving the thrusters of this series. One of the tasks was to make Compact series more attractive to the Customer including the price. One of the ways to achieve this goal was maximal simplification of the design process, including the process of propeller designing.

That's why in 2001 ABB ordered KSRI a research program for development of the propellers series applicable to all AZIPOD COMPACT thrusters (excluding high ice class). Present report consists of the main aspects of this series development.

*M.A. Mavludov, A.V. Pustoshny, A.A. Rusetsky, O.V. Yakovleva.* **Comparison of detrialled tests results of a small size waterjet (SSWJ) equipped ships with the results of model tests and calculation.** Pp. 82–92.

The article includes the data of trial propulsive characteristing of SSWJ equipped ship and its comparison with the prediction based on model test results.

Reliability of KSRI method for propulsion calculation of WJ equipped ships is approved by the above mentioned comparison.

*M.A. Mavludov, V.A. Matskevich, A.A. Rusetsky, A.V. Pustoshny, A.V. Sverchkov.* **The application of new means (resources) of resistance decreases and improves the qualities for Sea-river going ships.** Pp. 93–107.

For improving of technique economical factors of Sea-river going ships it is suitable to apply the means of decreasing of resistance; artificial cavity on the bottom and surface piercing propellers.

The updating project of Sea-river going ships is given; it is shown that realization of mentioned means allows to decrease in power of available ship for 45%. As it takes place the carrying capacity and the draught does not change and service consumption decreases for 10%.

*L.I. Vishnevsky.* **To the definition of the circulation flow around profile placed in two-dimensional stream.** Pp. 108–116.

This paper deal with the question of realization of Chaplygin-Jukovsky postulate at the trailing edge of the foil. It is shown that this postulate does not reflect viscosity of real medium enough. It is given the way out of this situation.

*M.A. Koutejnikov.* **On approach to imposing ship operational restrictions.** Pp. 117–132.

Question of how to impose justified ship operational weather restrictions is currently of much importance. A set of ship operational restrictions to be imposed is strongly interrelated with the wind/wave characteristics of navigation region. The paper introduces the complex approach to substantiation of operational restrictions with due account of the operational experience for ships of restricted navigation area. Acceptance criteria proposed are summarizing parameters of sea-keeping, long term/short term seaworthiness, manoeuvrability, ship motions, local and hull girder loads such as wave bending moment, inertial loads, slamming, etc. Short-term, long-term, specific and common seaworthiness criteria are introduced. The approach introduced is based upon the equivalent safety principle for each parameter under unrestricted and restricted areas of navigation. The methodology allows clearly determining a set of weather restrictions for any navigation region.