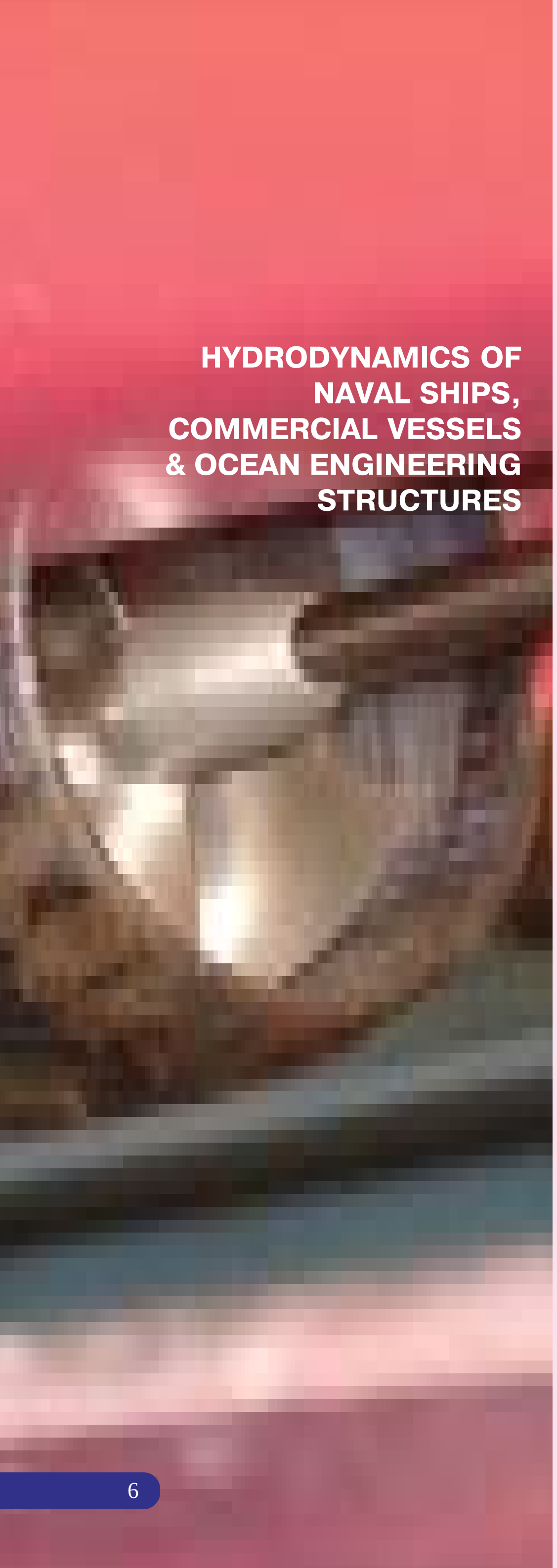


HYDRODYNAMICS OF NAVAL SHIPS, COMMERCIAL VESSELS & OCEAN ENGINEERING STRUCTURES

Traditionally, the Krylov Institute has been addressing the problems of hydrodynamics for naval ships, commercial vessels and ocean engineering structures.
The work was continued in the following areas:

- Propeller design;
- Studies of the potential application of artificially inflated cavities for large-size bulk carriers;
- Studies of hydrofoil vessels with automatically controlled foils.

Progress in the studies of high-speed ships resulted in the development of catamaran hulls enabling to combine the course stability at up to 70 knots, good seakeeping and high efficiency.
Much attention is paid to the improvement of computer technologies for the viscous flow analysis, design of propulsors and air cushion crafts. We use the standard software packages and the in-house developments.

CALCULATION PROCEDURE TO ANALYSE INTERACTION BETWEEN COAXIAL PROPELLERS IN THE PROPULSION SYSTEM "PODDED UNIT BEHIND THE MAIN PROPELLER ON THE SHAFT"

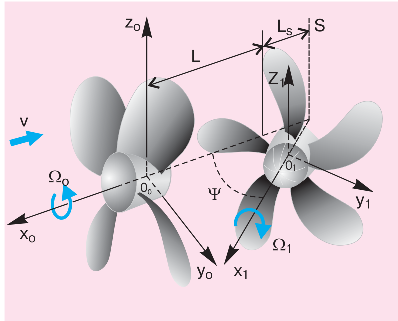
The podded unit behind the main propeller is a promising type of propulsors, which enables to enhance efficiency and to improve the craft maneuverability due to application of a pod with propeller as an active rudder.
More reliable prediction of hydrodynamic characteristics for coaxial propellers (PR) is ensured by the developed method of PR interaction analysis. To resolve the problem it was required to develop the calculation procedure, which enables:

- to calculate velocity fields in the propeller disc located on the pod behind the other propeller;
- to identify nonsteady forces and moments acting on the propeller blades in this velocity field.

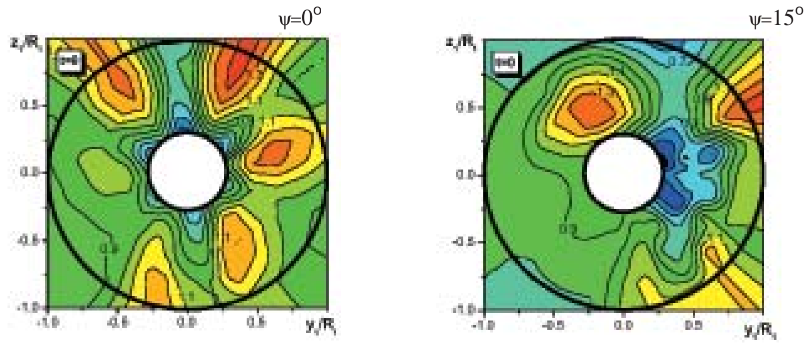
The performed work has enabled:

- to track changes in the velocity field in the propeller disc at propeller pod turning (turning angle 30°);
- to predict the hydrodynamic characteristics of the complex propellers considering the cross effects.

Results of this study will find practical application in the development of new types of propulsors.



Operational scheme for propeller in the pod behind the main propeller on the shaft in the non-uniform wake behind the ship aft end



Flow velocity distribution in the disc of rear PR at different angles of pod turning