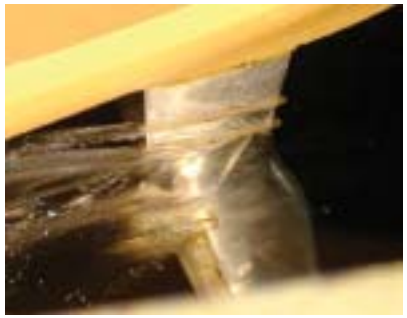
PREDICTION OF HYDROFOIL DYNAMIC BEHAVIOUR

The Krylov Institute continued research to support the design of car-passenger ferry of a new generation, as well as design of a passenger hydrofoil vessel.
A series of experimental studies and calculations were performed to define the craft dynamic behaviour at accidents associated with malfunctions of the foil flaps.
The performed research work has resulted in:

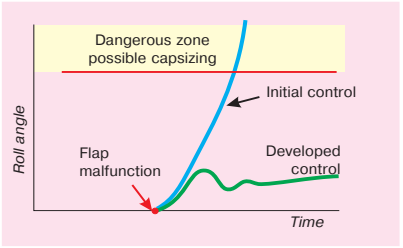
- optimization of experimental methods and gaining of new results with respect to hydrodynamic characteristics of the craft foils and hull in emergency conditions;
- developing and validating (from tests with constant speed) a mathematical model of



Hydrofoil car & passenger ferry

the craft controlled motion in case of flap failure and slamming enabling to:
– identify the craft spatial motion parameters and levels of overload arising from the flap failure that are necessary for the safety evaluation of the craft operation;
– develop the control law to eliminate the craft capsizing at side flap failure.

Investigation of foil hydrodynamic characteristics



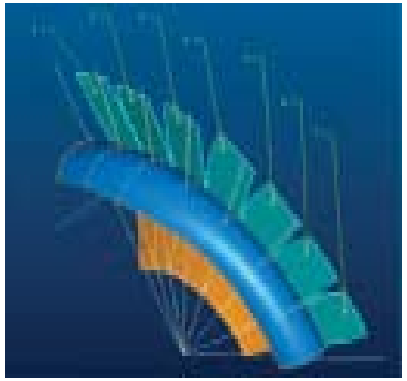
Selection of flaps control law to prevent vessel capsizing

The obtained results have enabled to identify the control laws that ensure the craft safety at flap failure and to formulate the validated requirements to equipment safety.

IMPROVEMENT OF DESIGN TECHNIQUES FOR FLEXIBLE SKIRT OF HOVERCRAFTS (HCR)

The performed work made it possible to:

- formulate the basic principles and develop fundamental analytic model on the basis of refined procedure for development of HCR flexible skirt;
- develop an interface for import-export of calculated data to the AUTOCAD system;



3-D scanning model for the forward part of the HCR flexible skirt

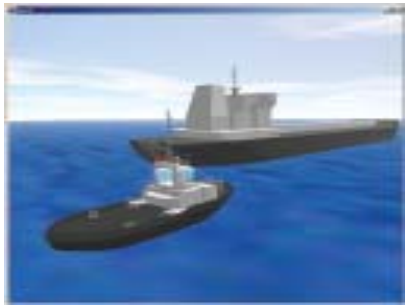
- select and test the high level CAD system in order to plot the 3-D model and to obtain the flexible skirt scanning.

Application of developed programs would allow to design the flexible skirts for HCR with ensured optimal parameters of the lifting system at substantial reduction of design labour intensity.

PLOTTING OF MATHEMATICAL MODELS FOR VIRTUAL MODELING OF DYNAMIC PROCESSES. DEVELOPMENT OF UNIFIED DATABASE

The main goal of this work was theoretical justification and development of basic mathematical and software support for virtual interactive modeling of various processes for marine engineering structures, intended for application in design, applied research and development of simulators.
The performed work has enabled to:

- analyze approaches used for mathematical and software support development for virtual interactive modeling of dynamic processes;



Graphical images of marine engineering structures

- formulate and justify the concept, scheme and algorithm for plotting virtual modeling dynamic processes;
- define requirements for available and newly developed mathematical models of marine engineering structures and environment objects, and also for their software implementation aimed at application in the basic package of mathematical and software support for virtual interactive modeling of dynamic processes;
- develop the unified database of graphical images for controlled marine engineering structures, environment and their mathematical models;
- develop the software prototype for operation with the unified database;
- plot the virtual interactive environment with introduction of different controlled structures of marine engineering.

The obtained results will be used in further development of mathematical and software support based on the proposed concept, as well as for the plotting of algorithm and pattern of dynamic processes for virtual interactive modeling.