

G.V. Boytsov, S.V. Sochinsky, E.A. Shishenin. **Assessment of service life characteristics of tank body joints to transport facilities.** Pp. 5–24.

The article offers guidelines on estimation of service life characteristics of tank body joints to transport facilities. Computational model and algorithm to determine forces acting in tank fittings under ship motions conditions are developed. Rough practical guidelines on tanks fatigue tests using the results of stressed-strained state computation performed for their bodies by finite-element method were proposed.

G.V. Boytsov. **Indispensable upgrade of requirements system to strength of ships of inland and restricted sea navigation.** Pp. 25–40.

The article presents substantiation for the necessity to revise computational algorithms for determination of dynamic loads as applied to regulation of overall strength of ships of the examined type. This has been done for shock bending moment so far. To estimate vibration bending moment procedure approved by RMRS Rules may be used, more detailed investigation is reasonable to be done using general theory of hydroelastic deformations of ship hulls. General common guidelines for strength computation of ships of inland and inland/sea navigation are determined.

V.I. Alpherov. **Correlation between engineering methods and thermoplastic solutions using FEM for computation of welding stresses and deformations of ship hull structures.** Pp. 41–62.

The existing computational methods for welding deformations regulated by branch regulatory documents are applied to computations and comparatively simple standard joints and flat sections. Further development of computational methods for estimation of welding deformations and stresses is reasonable using solutions of thermoplastic problem enabling more detailed simulation of the process.

V.I. Alpherov, N.A. Steshenkova. **FEM and thermoplastic problem solutions used for computation of residual welding stresses and deformations of tank shells using technology of single pass indirect automatic welding.** Pp. 63–84.

Simulation of extremely sophisticated thermal process of single pass indirect automatic welding of tank shells was made using solution of thermoplastic problem and FEM. Efficient algorithm including selection of relevant combination of shell and volume finite elements and procedure to solve the problem of non-linear thermal conductivity ensuring convergence and stability of computational process is developed.

O.E. Litonov. **Application of guidelines on explicit safety evaluation of ship operating in narrow ware areas.** Pp. 85–99.

The task to be met is to make risk assessments of ship operating in narrow water area with increasing traffic density and ship tonnage. Due to the typical insufficiency of input data it is reasonable to obtain more accurate comparative assessments. The article demonstrates that increasing number and deadweight capacity of ships result in higher emergency situation risks in terms of either accident rate and seriousness of consequences. The result is matrix shift with respect to reference one in terms of both accident potential and the level of their seriousness.

V.E. Segal. **New approaches in computer-aided calculations of ship hull strength.** Pp. 100–109.

New types of finite elements for computation of bending and constrained torsion of structures are developed. Element is of rectangular bar shape. Stiffness matrix has the following dimensions in global coordinates: at bending 16×16 , at torsion 20×20 . Stiffness matrix is obtained based on approximate solution of elasticity theory flat problem for bar. The theory represents synthesis of structural mechanics concepts and FEM possibilities and it is evolution of structural mechanics during computer-aided calculations.

G.B. Kryzhevich. **Design measures to reduce external force effects on high-speed catamarans and increase their sea-keeping capabilities.** Pp. 110–119.

This article describes ideas regarding reasonable selection of the vertical clearance distribution for the high-speed catamarans over their length, shape of the bow end for the cross-structure bridges and their extension over the ship length. Basing on calculation study of the longitudinal motions and external force characteristics imposed by wave-structure interaction, the nature of the ship design factor effects on the vertical accelerations is established, as well as the loads that govern the total and local strength of the high-speed catamarans under different speeds in irregular waves. Significant differences in slamming features for the low-speed, high-speed and planning catamarans are examined as well as design approaches required for these ships. Several principal positions of the design philosophy for high-speed twin-hulled ships are formulated.

G.B. Kryzhevich, V.V. Ishkov. **Analysis of effect of high-speed ship design and operational parameters on external forces that govern hull strength.** Pp. 120–128.

This article presents calculation analysis of the external forces that govern the hull strength developed basing on new method for calculation of the force effects on high-speed ship structures. Calculation studies are carried out considering presence of the small extension hydrofoils on the ship hull and hydrodynamic damping of the vibrations. Nature of the effects of the ship speed, wave intensity and ship design features (relative width of the waterline at transom end, fullness ratio of the design waterline, dimensions and location of the bilge keels) on the hydrodynamic forces that impose dynamic hull bending and decaying of the bending vibrations. Also the authors provide calculation results that illustrate nature of the passive motion stabiliser effect on bending moments in the hull amidship cross-section during transition regime.

A.P. Anosov, A.I. Mamontov. **Design of quadrate two-layer plate. Influence of edge effects on stressed state of two-layer quadrate plate in elastic stage.** Pp. 129–141.

This methodology is being developed through series of numerical experiments. One of the goals of these experiments is determining value of the acting load, at which at least in one of the calculation model components the stresses of the fibre yield appear. Methodology for designing the plate with step-variable thickness is applied to determine optimal dimensions of the overlapping section in accordance with criterion of the limiting load and criterion of the failure mechanism generation. As most dangerous mechanisms could be considered those, where line of transition of the overlapping section into the plate section coincide with forming of the plastic hinge.

E.P. Bourakovskiy, V.A. Dmitrovskiy, Z.G. Kotsedaeva, V.P. Prohlich. **Probability model in predicting residual buckles under goffering.** Pp. 142–156.

The article examines new approaches in predicting parameters of the developing defects, in particular, in case of goffering. It is assumed that rise of buckles under goffering is not only result of multiple applications of the load with the same intensity but also effect of the loads with greater intensity, as well as degrading of the brace characteristics due to the interdependence of the defect parameters. A probability mathematical model is developed that relates accidental flow of the loads on the floor with parameters of the defects imposed by them. Proposed model allows reducing scopes of the repair due to accounting the strength reserves, use individual approach in determining the scopes of the repairs, promptly consider changing operation conditions. This model could be also applied to determine values of the external loads with respect to the residual deformations.

P.E. Bourakovskiy. **Accounting plating stiffness in case of deformation of ship board floors, which receive intense local loads.** Pp. 157–170.

An improved methodology for estimation of the lifting capacity of the locally loaded board floors components is developed. It is demonstrated that accounting of the plating plate stiffness changes both nature of the line deformation and quantitative characteristics of the lifting capacity of the board floor lines as well.

A.V. Gladilin, V.M. Baronkin. **The efficiency of matched Green's function passive detection algorithms.** Pp. 171–183.

The problem of matched processing algorithm's sensitivity to a priori data uncertainties is analyzed. The effect of incorrect Green's function description on locally-optimal detection algorithm efficiency (in terms SNR) is investigated. The examples of the efficiency evaluation for shallow water are considered.

A.V. Gladilin, V.M. Baronkin. **The efficiency of matched noise covariance matrix passive detection algorithms.** Pp. 184–197.

The impact of incorrect noise covariance matrix description on locally-optimal detection algorithm efficiency (in terms of SNR) is analyzed. This analysis allows to justify the necessity of «learning» for noise parameter estimation or/and using adaptive algorithms. Two examples are considered. The first example concerns array functioning in waveguide. The second example – linear array functioning under structural interferences presence.

V.M. Baronkin, A.V. Gladilin. **Estimation of covariance matrix parameters of structural interferences.** Pp. 198–204.

In certain cases the presence of structural noise must be taken into account under space-time processing algorithms construction. To construct optimal and suboptimal detection, localization and classification algorithms (including the adaptive ones), a need arises for effective methods to estimate parameters of structural interferences. Our purpose here is to consider some aspects to solving this problem.

B.M. Baronkin, A.V. Gladilin. **Evaluation of threshold SNR for track detection algorithm.** Pp. 205–218.

One way of increasing the efficiency of detection algorithms track detection of motion signal sources. In the paper the relation of threshold SNR and entropy of trajectories sources is found.