

Determination of characteristics of ship equipment

1. Foundations of the dynamics of ship devices

- 1.1. Problems of the dynamics in the calculations of ship devices
- 1.2. The general equations of masses motion; the reduction method
- 1.3. Dependences of analytical mechanics
- 1.4. Free and forced oscillations of a system with one degree of freedom
- 1.5. Forced oscillations of the system of unit mass under the action of a harmonic force
- 1.6. Oscillations in the light of the nonlinearity of the restoring force and resistance

2. Random oscillations

- 2.1. Random variables, probability characteristics
- 2.2. Random functions
- 2.3. Determination of the probability characteristics of random fluctuations on the characteristics of the random disturbance

3. External influences on the ship devices

- 3.1. Coordinate systems
- 3.2. Sea waves
- 3.3. The influence of the screening effect of the hull to waves at the side; change of waves parameters on deep
- 3.4. Rolling of the vessel in rough seas
- 3.5. Kinematic characteristics of the oscillations of arbitrary points of the vessel when it is rolling
- 3.6. Parameters of the separate linear movements of two ships together with their rolling
- 3.7. The hydrodynamic forces acting on the lifted objects from the sea onboard

4. Flexible mechanical connections in the elements of ship equipment

- 4.1. Understanding and application of flexible connections
- 4.2. Specific types of ropes, recommendations for the use of ropes
- 4.3. Materials of flexible shells of ship devices

5. Physical and mechanical properties of flexible connections

- 5.1. The weight and strength of flexible connections
- 5.2. The deformation of flexible connections
- 5.3. Frictional properties of flexible mechanical connections

6. Fundamentals of mechanics of models of flexible filaments and soft shells

- 6.1. Problems in mechanics of flexible filaments in the calculation of ship devices
- 6.2. The equations of equilibrium of a plane and a flexible filaments and solutions of the equations
- 6.3. Broaching of filament across the solid cylinder
- 6.4. Flexible filament in gravity force action
- 6.5. The longitudinal oscillations of a flexible filament
- 6.6. Ropes in water flow
- 6.7. Comparative evaluation of ropes and chains mechanics
- 6.8. Calculation of long cylindrical shells

7. Launching and lifting gears for autonomous devices, scope and classification of launching and lifting gears

- 7.1. General characteristics and purpose of launching and lifting gears for autonomous underwater objects

- 7.2. Launching and lifting gears for autonomous submarine research vehicles
- 7.3. Launching and lifting gears for operations with small boats
- 7.4. Launching and lifting gears for lifting barges on to barge-carrier vessel
- 7.5. Classification of launching and lifting gears
- 7.6. Factors of safety of launching and lifting gears

8. Elements of launching and lifting gears and conditions of use of gears

- 8.1. Design sites for safe initial contact of launching and lifting gear to picked up object
- 8.2. Device for mechanical tracking the movement of floating objects in sea waves
- 8.3. Automatic lifting system of object from the water
- 8.4. Shock absorbers of launching and lifting gear
- 8.5. Swing limiting devices and centering devices

9. Theory of launching and lifting gears

- 9.1. The calculation tasks of the general design of launching and lifting gears
- 9.2. Calculation scheme of launching and lifting gears for lifting mode
- 9.3. The factor of dynamic load during lifting
- 9.4. Analysis of the impact of the installation efforts in the shock absorbers to dynamic loading in an elastic connection
- 9.5. A probabilistic calculation of factor of dynamic load of launching and lifting gear
- 9.6. The choice of the strength of the elastic connection to a given probability of failure-free operation
- 9.7. An example of the practical calculation of factor of dynamic load
- 9.8. Evaluating the effectiveness of swing limiting device
- 9.9. Determination of the main characteristics of tracking ropes
- 9.10. Check of automatic capture operation in the rolling conditions

10. Launching and lifting gears for remotely operated vehicles, classification and design options

- 10.1. Purpose, general characteristics and classification
- 10.2. Structural features of gears for launching of remotely operated vehicles in the water from the stopping vessel
- 10.3. Structural features of devices for remotely operated vehicles towed

11. Calculation methods of gears for launching of remotely operated vehicles

- 11.1. Working conditions of gears onboard stopping vessel and the problem of their designing
- 11.2. Vertical motions and tension in the cable-rope to container in the marine environment oscillations
- 11.3. Accounting of water resistance to the movement of container in the marine environment oscillations
- 11.4. The influence of sea waves on the tension in the cable-rope when lifting the container from the water surface and lifting through the room in the ship's hull
- 11.5. The separation of object when lifting from the bottom
- 11.6. Conditions of devices operation for container towing with scientific equipment and design problems of these devices
- 11.7. The tension in towing cable-rope to the vessel move
- 11.8. Dynamic load in contact of gripping device with the container

12. Cargo transfer devices and change of people in the sea, the general characteristics and structural options

- 12.1. Features of the processes of cargo transfer and change of people in the open sea, the classification of devices
- 12.2. Structure of devices for cargo transfer by contact approach
- 12.3. Devices for change of people by contact approach
- 12.4. The devices for cargo transfer to contactless way in towing aft
- 12.5. General characteristics of the device to traverse cargo transfer
- 12.6. The structure of gear for transfer of liquid and general cargoes to traverse way

13. Methods of devices characteristics calculating for cargo transfer

- 13.1. The calculation objectives of general design of devices for cargo transfer
- 13.2. Probabilistic assessment of cargo impacts of ship in the cargo operations in sea waves
- 13.3. Determination of the dynamic loads during lowering of the load on the deck of the receiving vessel
- 13.4. Determination of traverse swing of cargo load in gears with vertical auxiliary tracking rope
- 13.5. Determination of tension in the ropes and the trajectory of the cargo in the traverse cargo transfer devices
- 13.6. Evaluation of the vertical oscillations of cargo in ships rolling at traverse cargo transfer

14. Hatch covers of ship cargo holds

- 14.1. Features of hatch covers and their classification
- 14.2. Removable and hinged covers
- 14.3. Rolling, sliding and wound covers
- 14.4. Hatch covers seal units
- 14.5. Determination of the effort needed to open the lids of hatch covers

15. Closure of cargo passes in a surface part of ship's hull

- 15.1. General characteristics of the closures; the closing side
- 15.2. Closure of cargo openings in the ship's peaks

16. Fender protecting of moored ships and offshore rigs, general information on the fenders and the principles of their calculation

- 16.1. Purpose of fender protection and classification of fender protection methods
- 16.2. Working conditions, the principles of calculation and fenders quality criteria

17. Mooring fenders

- 17.1. Concepts of mooring fenders design
- 17.2. The form, location and characteristics calculation of mooring fenders pneumatic
- 17.3. Structure of mooring fenders pneumatic
- 17.4. Damping mooring fenders
- 17.5. Elastic mooring fenders

18. The bow and aft fenders and rub rails

- 18.1. The bow and aft fender
- 18.2. The rub rails

19. Stabilizers of the vessel rolling, general information

- 19.1. Purpose and classification of the vessel rolling stabilizers

19.2. Physical basics of the vessel rolling stabilizers work

20. Rolling stabilizers gravitational and with sides rudders controlled

- 20.1. General characteristics and classification of rolling stabilizers gravitational
- 20.2. Calculation of characteristics of пассивных успокоительных цистерн
- 20.3. Structure of sides rudders controlled
- 20.4. Calculation of characteristics of sides rudders controlled

21. Devices and equipment to attach and move cargo onboard ships, classification of devices for cargo attachment, their working conditions

- 21.1. General characteristics of devices for cargo attachment; working conditions of the attachments
- 21.2. Forces acting on the cargo in sea waves ship rolling
- 21.3. Evaluation of reliability of cargo attachment and a possibility of it shift or tipping
- 21.4. Characteristics and classification of devices of ships carrying wheeled vehicles: ramps, car lifts and platforms

22. Devices for general cargo attachment onboard

- 22.1. The main elements of attachment
- 22.2. Devices for mounting of heavy and large cargo ships
- 22.3. Ship devices for fastening of wheeled vehicles, containers and barges onboard barge-carriers
- 22.4. Device for cargo securing by airbags
- 22.5. Devices for binding of logs cargoes

23. Devices used to transport bulk cargo onboard

- 23.1. Methods of grain transportation and working condition of equipment on ships for transportation of grain
- 23.2. Devices with separatory partitions and feeders
- 23.3. The devices of veils of grain