

ABOUT THE IDENTIFICATION ACCURACY OF HYDRODYNAMIC PROPERTIES OF THE AUTONOMOUS UNDERWATER VEHICLE

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ABSTRACT

The hydrodynamic properties of an autonomous underwater vehicle are related to the number of basic factors determining the quality of control during spatial motion. The experimental data based on results processing of trajectory measurements obtained in real sea operations, are used for the identification of these properties and theoretical dynamics models. A formulation of the problem leads to steady-states and transient states analysis of motion, and hydrodynamic properties evaluation of underwater robot on the basis of correct mathematical motion model and clean data of the observed motion. The state vector of underwater robot contains set of navigation and orientation information and control actions of propulsion system. The developed program procedure of identification enables to evaluate the hydrodynamic properties and to carry out comparative analysis with the computer simulation results in the virtual environment.

Keywords: autonomous underwater robot, hydrodynamic properties, motion control, identification.

REFERENCES

1. Ageev M.D., Kiselev L.V., Matvienko Yu.V. et al. *Avtonomnye podvodnye roboty: Sistemy i tekhnologii* [Autonomous underwater robots: Systems and technologies]. Moscow, Nauka Publ., 2005, 400 p.
2. Kiselev L.V., Inzartsev A.V., Medvedev A.V. About some tasks of dynamics and control of spatial movement AUV. *Podvodnye issledovaniya i robototekhnika – Underwater Investigations and Robotics*, 2006, no. 2(2), pp. 13–26.
3. Mel'man S.V., Bobkov V.A., Inzartsev A.V., Pavin A.M., Cherkashin A.S. Software simulation framework on the base of multiprocessing architecture for autonomous underwater vehicles. *Podvodnye issledovaniya i robototekhnika – Underwater Investigations and Robotics*, 2015, no. 1(19), pp. 23–32.
4. Ponyrko S.A., Popov O.S., Yastrebov V.S. *Adaptivnye sistemy dlya issledovaniya okeana* [Adaptive systems for research of the ocean]. St.-Petersburg, Sudostroenie Publ., 1993, 223 p.
5. Pelevin A.E. Identifikacija parametrov modeli ob'ekta v uslovijah vneshnih vozmushhenij [Identification of object model parameters under external disturbances]. *Gidroskopiya i navigatsiya - Gyroscopy and Navigation*, 2014, no. 4, pp. 111–120.
6. Kiselev L.V., Medvedev A.V. Comparative analysis and the optimization of the autonomous underwater robots dynamic properties of different projects and configurations. *Podvodnye issledovaniya i robototekhnika – Underwater Investigations and Robotics*, 2012, no. 1(13), pp. 24–35.
7. Kiselev L.V., Medvedev A.V. On parametric relation of hydrodynamics and motion stability of the autonomous underwater robot. *Podvodnye issledovaniya i robototekhnika – Underwater Investigations and Robotics*, 2013, no. 1(15), pp. 17–22.
8. Matvienko Yu.V., Boreyko A.A., Kostenko V.V., L'vov O.Yu., Vaulin Yu.V. Complex robotic tools to perform searches and surveys of underwater infrastructure on the shelf. *Podvodnye issledovaniya i robototekhnika – Underwater Investigations and Robotics*, 2015, no. 1(19), pp. 4–15.