



Investigations of coastal zones using a modular amphibious vehicle

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The project aims to develop a means of verification of data on sea excitement derived from Autonomous mobile robotic system (AMRS) for coastal monitoring and forecasting marine natural disasters [Kurkin A., Pelinovsky E., Tyugin D., Giniyatullin A., Kurkina O., Belyakov V., Makarov V., Zeziulin D., Kuznetsov K. Autonomous Robotic System for Coastal Monitoring // Proceedings of the 12th International Conference on the Mediterranean Coastal Environment MEDCOAST. 2015. V. 2. P. 933-944]. The chassis of the developed remote-controlled modular amphibious vehicle (MAV) will be equipped with a video camera and a hydrostatic wave-plotting device with strings sensors mounted on the stationary body's supports. To track the position of the MAV there will be installed the navigation system in order to correct the measurement data. The peculiarity of the tricycle MAV is the ability to change its geometric parameters that will increase its stability to actions of destructive waves and mobility.

In May-June 2016 authors took part in conducting field tests of the AMRS on the Gulf of Mordvinov (Sea of Okhotsk, Sakhalin Island). Participation in this expedition contributed to obtaining experimental data on the topography and the physical and mechanical properties of the surf zone of the most promising field of using the MAV as a road for its moving.

Within the project there was developed a mathematical model of the MAV motion in coastal conditions taking into account the new analytical dependences describing the physical and mechanical characteristics of the ground surfaces and the landscape, as well as hydrodynamic effects of surf zones. The reasonable selection of rational parameters of the MAV and developing the methodology of creating effective vehicles for investigations of specific coastal areas of the Okhotsk Sea will be made by using the mathematical model.