

<i>Work package 1: Problem formulation and numerical simulations of the flow around underwater bodies</i>
<i>Start and end of the work package:</i> from Month 1 to Month 12
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<i>Participants in the implementation of the work package:</i> Aleksandrina Vasileva, Dobrin Efremov
<i>Planned tasks:</i> 1.1 Formulation of the task of flow around body under free surface near the bottom 1.2 Selection of two suitable test cases for numerical simulations 1.3 Preparation of test case 1 - elongated body flow 1.4 Preparation of test case 2 - wing with symmetrical profile flow 1.5 Development of models for numerical simulations and calculations
<i>Task 1.1</i> Formulation of the task of flow around body under free surface near the bottom
<i>Deliverable</i> Selected test cases, for which the numerical and experimental studies will be performed. As starting objects of research are envisaged: - Streamlined elongated body, widely accepted as a reference for research on underwater bodies and appliances - Wing with symmetrical profile
<i>Task 1.2</i> Preparation of test cases for numerical simulations
<i>Deliverable</i> After selecting the object for numerical simulations, the input data it is to be prepared for imported into available software STAR CCM of CD Adapco Company for solving the averaged over Reynolds equations of Navier-Stokes (RANSE). This software allows modeling of fully viscous flows, including with the presence of free surface. Similar procedure will be performed preparing input data for software product v-Shallo by which is solving the nonlinear potential flow at presence of free surface, i.e. including wavemaking and wave resistance. Flow simulations around the wing will be carried out using ANSYS software to determine the characteristics of the body drag and lift characteristics.
<i>Task 1.3</i> Performing of numerical simulations for the studied parameters and summary of results
<i>Deliverable</i> <u>1-st case: elongated body</u> Conducting parametric numerical simulations study of the hydrodynamics of underwater body floating near the free surface at limited water depth. Parameters of the tests should be: depth of immersion of the body, angle of attack, geometric parameters of the body. Studied hydrodynamic characteristics: forces and moments on the body (6 DOF); nominal velocity field; pressure field around the body.

2-nd case: symmetrical wing

Vertically submerged near the free surface wing is investigated for different depths of immersion at different flow velocity. Determination the body drag and resistance.

Summary of both cases results from simulation experiments.

Results, which will be used for evaluation of the intermediate or final report of the project¹

¹ Scientific publication (accepted or submitted) in the journal with impact factor, or patent or build research equipment with unique features; for projects in the field of social sciences and humanities - publication in a refereed and indexed journal or reviewed studies or part of the monograph.