DETERMINATION OF CONDITIONS OF SIMILITUDE THROUGH THE „ METHOD OF THEOREME π ” FOR UNDERWATER ROBOTS MOVEMENTS

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Abstract: It is hard to anticipate or simulate the real underwater vehicle's trajectory because of the multitude of parameters implied. The way to reach some results is to design a mathematical model based on indeterminate equations system, with complex results, where some of the parameters are ignored or approximated. It is easy to understand that this method involves errors concerning the similarity accuracy. Modeling by similarity method means to find interested parameters by studying on the miniaturized model. It is very important to follow up the appropriate similarity criterion when models are selected and constructed.

The paper presents the research concerning underwater robots movement and brings the following original contributions:
- study of movements at reduced speeds of underwater robots, according to the parameter „time", with modulated impulses, through the method of similitude;

- simulation of robots functioning at natural scale through the method of similitude and the determination of similitude conditions specific to the „Method of theorem π – of dimensional analysis"

- modeling of the movement at low speed of underwater robots through the method of similitude;

- determination, by the help of the similitude criteria of the rate of flow around the full-size robots' hulls, of the total advance movement coefficients, and of the form ones (which are due to the pressure forces), as well as of the friction ones (which are due to the viscosity forces), which are identical on a mock-up with those acting in a real situation and size, underwater.

- provides the conditions for a homogenous and uniform distribution of attack speeds in the experimental vein in which the tests were made.

After placing the mock-ups in the experimental zone TA 1", the next step was the measurements and visualization of the tests. In order to know the aspect of the floor, there was a prior visualization of the flow in the limited layer existing at the surface of the models, through the method of wires

In accordance with the research directions and the operational requirements of the theme under observation , the tests were made for incidental angles, air draught with values of: 0^0, $±5^0$, $±7,5^0$, $±10^0$, $±15^0$, $±20^0$, $±25^0$.`The monitoring of the phenomena appeared in the aerodynamic tunnel TA1, was made by picture taking and filming often tests. The effective visualizations of the liquid flow within the limited space around the models were calculated for the values of the incidence angle "α" equal with cu: 00, ±100, ±200.

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