Using a measuring system for the study of POLIS d'Alembert's paradox and the continued use of this phenomenon for various spheres of power.

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The measuring system POLIS, based on the digital flow visualization techniques for measuring velocity fields in liquids and gases (PIV, Tomo PIV, Stereo PIV, Micro PIV), as well as methods for measuring the diameters of droplets and bubbles (IPI, PFBI), fields of concentration, temperature, and film thickness (PLIF, LIF), allow to solve a variety of scientific and applied problems. The main objective was to create an installation showing the d'Alembert's paradox and with the help of a measuring system to measure the velocity field POLIS flow symmetric body airflow.

The basic method for the study of selected PIV-method (method for measuring instantaneous optical fields or gas velocity of the fluid in the selected section of the flow). Thin knife light from a pulsed laser illuminates fine particles in the test stream does two more successive laser flash, which recorded a special digital camera. Consequently, the rate is determined by calculating movement, which make the particles during the time between the laser flash. Determination of displacement based on the use of correlation methods for tracer paintings, using regular decomposition into elementary regions.

The basis of the experience of the first leg d'Alembert's paradox (at steady flow of a solid stream of air drag-free). To see this, consider the symmetric flow around the body, shown in Figure 1. The current lines are symmetrical about the plane, and the particle velocity of air at the appropriate points in front of and behind the body are equal in magnitude and differ only in direction. Pressure at these points equally according Bernoulli's equation. Now the components of the force of pressure at points a direction parallel to the flow, cancel each other out. Since the total force exerted on the body by the flow equals the sum of the air pressure forces acting on the individual elements of the solid surface, the drag is absent.

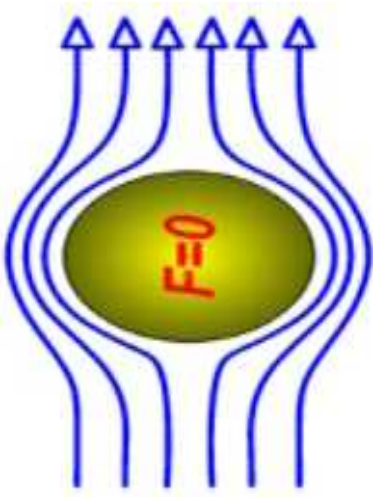

Figure 1. Wrap symmetric body uniform air flow.

The essence of the first experiment was to measure the velocity fields of flow around a sphere flow of air in the pipe. For the experiment took: Plexiglas tube with an outer diameter of 50mm, 45mm and inner wall thickness of 3 mm, light ball source blowing air and the measuring system of the POLIS.

Schematically setting characterizes d'Alembert's paradox is presented in Figure 2.

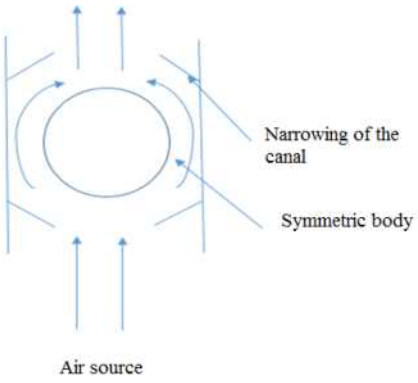

Figure 2. Installation

In order to rotate the ball quickly, you need to do before and after the constriction of the ball. As a result, the air will begin to flow around the ball and drag is equal to 0, d'Alembert's paradox.

During the experiment clearly demonstrated d'Alembert's paradox (the result of the vanishing of the total force acting on the body from the air stream). Further, with this setting and measuring system must be measured POLIS velocity field of air at a flow object.