



DINAMICAL PROCESSES IN LIQUIDS AND GASES VISUALIZATION

USING OF LASER REFRACTOGRAPHY TECHNIQUE

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Main subjects: heat and mass transfer, flow visualization

Fluid: liquids flows, boundary layers, two layers flows

Visualization method(s): laser refractography

Other keywords: digital image processing, structured laser beams

ABSTRACT: For visualizing non-stationary physical processes in liquids and gases, which arise when the gradient fields of temperature, pressure, density, salinity and others are in presence a new refractive method for flow investigation - Laser refractography is used [1-2]. On basis of structured laser beams the possibility of formation of exploratory area, which is a family of surfaces such as cylindrical, conical, or other type is carried out [3]. Digital recording and processing of refraction patterns make it possible to simultaneously explore spatial and dynamic, including waves, characteristics of the physical processes in the liquid.

The objects of study are non-stationary temperature fields in the boundary layer, two-layer stratified salty fluid and wave processes in them, the acoustic field in the fluid volume, etc. The results of computer modeling and experimental diagnostics of the investigated processes are presented. Feature of the proposed algorithms for processing of the visualization results is the use of rigorous analytical and asymptotic methods to minimize the computational resources and in some cases to process the experimental results in real time. This report presents special-purpose experimental setups dedicated to monitoring the dynamic physical processes in the liquid and for visualization of results, obtained with their help (Fig. 1, 2).

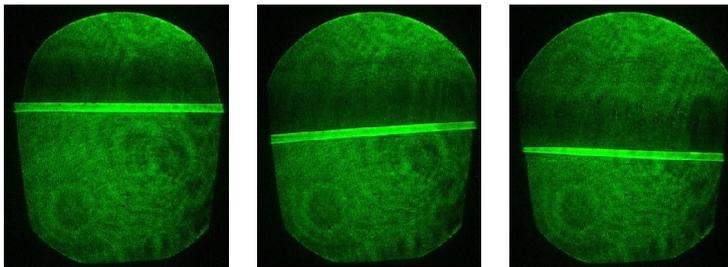


Fig.1 Visualization of internal waves by a wide beam for different times

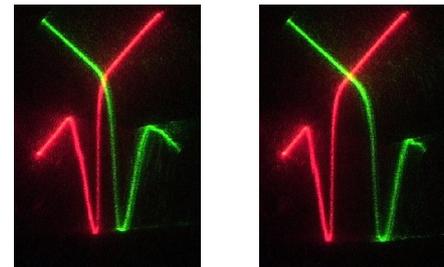


Fig.2 Experimental 2D-refractograms laser sheets in two layer liquid for different times

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