

Flow velocimetry in former Soviet Union States

Dmitriy M. Markovich¹, Nikita A. Fomin²

1: Institute of Thermophysics, Siberian Branch of RAS,
1 Lavrentyev ave., Novosibirsk, 630090, Russia.

2: Physical and Chemical Hydrodynamics Laboratory
Heat and Mass Transfer Institute of National Academy of Sciences of Belarus
220072, ul. P. Brovki 15, Minsk, Belarus'

Abstract

The present work gives an introduction to historic aspects of planar optical techniques for flow velocity measurement development in republics of former USSR. In general, the work can be divided into two parts. The first one describes the origins of development of stroboscopic instruments in the Institute of Thermophysics (Siberian Branch of Russian Academy of Sciences, Novosibirsk) in collaboration with other institutions. In particular, instantaneous velocity fields were measured in channel turbulent flows (water as working fluid was used) with special emphasis to the near-wall region. For three-component velocity field measurements near the wall the mirror wall was used. As the light source the pulsed mercury lamp was used and photo film was utilized for image storage. By processing digital data via an electronic computer, statistical characteristics of the flow (mean velocity fields and distributions of Reynolds stresses) were calculated for wall-bounded turbulent flows. Also, the prototype of "micro-PTV" was elaborated for the measurements of the instantaneous velocity profiles in the liquid film wavy flows by using semi-automatic image processing.

The second part of the work describes history of speckle anemometry development in former Soviet Union. This technique was elaborated mainly in the Heat and Mass Transfer Institute (Minsk, Belarus) by group of Nikita Fomin. Speckle velocimetry was applied in turbulent flow studies, combustion and detonation diagnostics and number of another applications.