



THE INTERACTION OF EXPERIMENTAL AND NUMERICAL VISUALIZATION OF FLOWS WITH SHOCK WAVES.

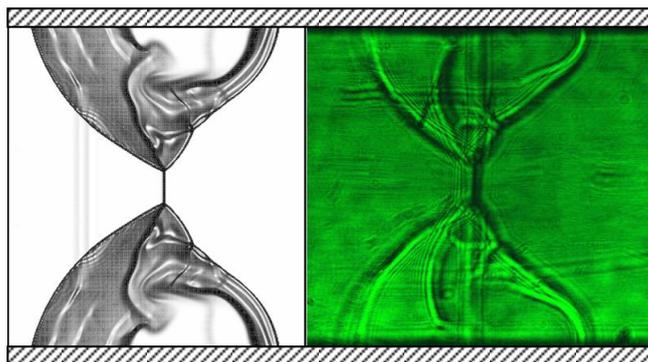
I.A.Znamenskaya

Lomonosov Moscow State University, Faculty of Physics, Russia

E-mail: znamen@phys.msu.ru

An important feature of the modern flow visualization is the convergence of the numerical and experimental visualization. Results of CFD calculations are simulated as shadow, PSP, PIV images, interferograms. The objective of the convergence is CFD algorithms and models verification and experimental data clarification.

The lecture deals with the problem of using the experimental data on experimental flow visualization for CFD calculations verification. Shock wave interactions with obstacles, gas discharge plasma, shock wave exit from shock tube end – these were the processes visualized using shadowgraphy, BOS, PIV methods (MSU), color Schlieren method (UWJ). Detailed high performance computing of the 2D (and 3D) problems were conducted. The unsteady Euler equations and Navier-Stokes equations were solved with finite-volume Godunov method of high order. CFD images were compared with experimental flow visualization. Kelvin–Helmholtz instability was observed experimentally and in CFD calculations in flow with pulse discharges and in curved channel profile. The inverse problem of energy value and allocation in flow with pulse local energy input was solved for different flow configurations. The benefits of the approach are discussed.



Comparison of CFD and shadow flow visualization.

Shock configuration after pulse energy input.