THIN-FILM LIQUID CRYSTAL INDICATORS OF TEMPERATURE AND SHEAR STRESSES ON THE MODEL SURFACE

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Fluid: subsonic flows, high speed flows
Visualization method(s): shear- and temperature sensitive liquid crystals
Other keywords: laminar-to-turbulent transition, separation

ABSTRACT: Today, along with the methods of measurement of local flow parameters on model surface (temperature, tangential stress), in progress and upgrade are the procedures of panoramic visualization and these parameters measurement. With this aim in view, thin-film coatings are used; they contain the active medium with the optical properties which change under the external action. Liquid crystals are applied as this active medium [1]. The spectrum of liquid crystals with helicoid**s** supramolecular structure changes under the action of temperature and mechanical shear. It allows to apply them to visualize temperature and shear fields [2]. The requirements, imposed to the liquid crystals for temperature and tangential stress visualization, are different. The purpose of the work is to present a brief review on the properties of shear- and thermosensitive liquid crystal materials. The principles of creation of shear- and thermosensitive liquid crystal materials will be presented, the methods of their study will be described, as well as the results obtained by their application .

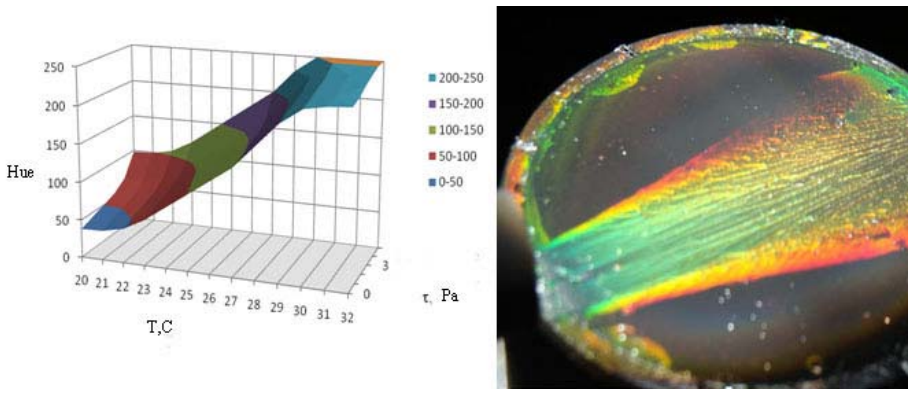

Fig. 1. An example of temperature and shear dependence of chromatic coordinate Hue (left image), visualization of the shear distribution under interaction of circular subsonic jet with the model surface (right).

References

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