VISUALIZATION OF PHYSICAL PROCESSES IN LIQUID DROPS ON HORIZONTAL SURFACE

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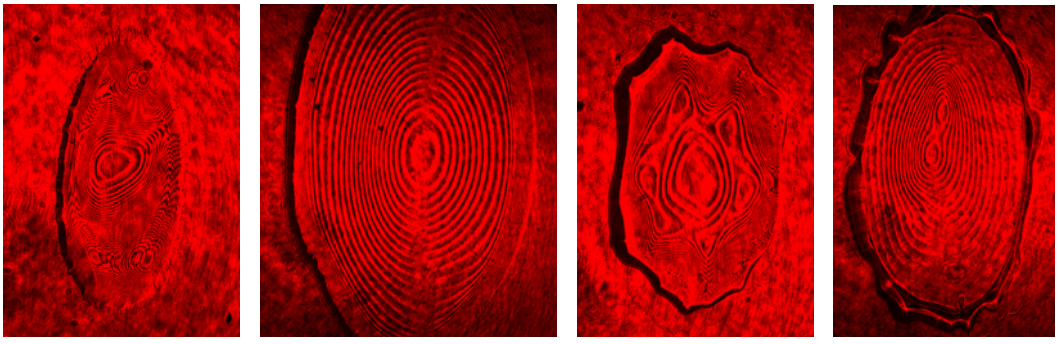
KEYWORDS:

Main subjects: liquid drop
Fluid: liquid drops evaporation
Visualization method(s): frustrated total internal reflection, interferometry
Other keywords: evanescent waves

ABSTRACT: The aim of this work is application of well-known method of frustrated total internal reflection (FTIR) of laser beam for visualization and investigation of physical processes occurring during the evaporation, cooling and spreading of liquid drops on horizontal surface. For this purpose created experimental setup was upgraded. This setup was successfully used for visualization of liquid flows in microchannels. It's scheme and principle of work was described in papers [1, 2].

One of the faces of glass prism was horizontal substrate for evaporating liquid droplets. The angle of incidence of the beam was chosen so that it was more than TIR critical angle for glass-air interface and less than such angle for glass-liquid interface. In this case the part of laser radiation penetrates into the drop, than reflected from its external surface and interfere with the radiation reflected from prism surface. Examples of experimental interference images are shown in fig. 1. In experiments such liquid as the distilled water, isopropyl spirit, ethyl spirit, solvent, acetone, water solutions of salt and sugar were used. Analysis of changes in this interference patterns in time provides a extensive information about the dynamics of evaporation of liquid drops on a solid surface.



a) b) c) d)

Fig. 1 Examples of interference images of evaporating liquid drops: a) – isopropyl, b) – solvent, c) – acetone, d) – ethyl

Acknowledgements

This work was supported by RFBR grant № 10-08-00936-a.

References

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