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Transport of Droplet Matter by Fine Components of Flows in the Stage of First Contact to a Liquid Layer Surface

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The main attention of this investigation was paid to mechanisms of transport of droplet matter into the target liquid and into the air in the stage of first contact to a liquid surface at the rest. The research took place at the mode of formation of a wide central jet that was set by means of changing the height of free falling of a drop and drop diameter. Pure water, alcohol and different concentrations of ink were used as a matter for drops creation and for target-liquid layers.

There are two fundamentally different groups of fine flows that appear at the moment of a first touch and annihilation of free surfaces of a drop and liquid layer. First of them is a thin disk jets that surround a droplet and fly out from contact area into the air with great velocity. Separation of the smooth surface into the radial periodic structures takes place already at the first time of contact as well. One should note here that these jets are transformed in a case of free falling drop of ink into pure water and form periodical vertical ribs at the surface of cylindrical wreath placed above the liquid layer.

In a case of using liquids with different coefficients of surface tension the convective structures are observed. These flows caused by surface tension gradient are Marangony instability. The direction of the flows depends on relation of surface tension coefficients: toward or from contact area.

These fine flows described above submit the pattern of transport of matter at the first moment of contact and are cause of some flows after.