ELECTRONIC SUPPLEMENTARY INFORMATION

Photonic vortices induced in single-component phototropic liquid crystal

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M1 – Photonic vortex

A short video shows photonic vortex generated in isotropic phase of phototropic liquid crystal droplet deposited on a glass plate. The droplet was illuminated from the glass side by 405 nm laser beam. Movie was taken by CCD camera under polarizing optical microscope. Observations were made through crossed polarizers what resulted in dark-color background and orange-colored microparticles taking part in hydrodynamic swirl.

M2 – Photonic vortex with changed geometry

A short video shows the formation of toroidal vortex by action of 405 nm laser light on the liquid droplet (phototropic liquid crystal in its isotropic phase). Laser beam was directed from the glass side – through glass- liquid interface. We can see change in vortex geometry through to the fact that laser beam illuminates border parts of droplet. Moving the laser beam slightly toward the droplet center results in the appearance of a hole, which indicates where laser beam hits and where is the center of vortex.

M3 – Deposition of particles on glass substrate

A short video illustrates deposition of carbon microparticles on glass substrate during vortex swirling. This time the laser beam was directed from the side of droplet – through air-liquid interface. One can see that those particles start to accumulate in the place, where the laser beam illuminates liquid droplet. It is also possible to perceive a direction of toroidal vortex flow (from the top of the layer toward its bottom) because of the traces left by carbon particles.

M4 – Carbon microparticles pulled by the vortex (view from the side)

In this short video one can see how the carbon particles are flowing on the surface of the isotropic droplet when laser beam illuminates droplet through air- liquid interface. Seemingly vortex pulls particles into its center and swirls them from the droplet surface to its bottom. Some objects are ejected outside the vortex if they are too large to be included in the fast fluid movement.

M5 – Carbon particles pulled by the vortex (view from the top)

This short video is complementary to M4 one. In this case a movie was made by the looking at the surface from the top.