Internal vortex scanning method in optical vortex microscopy

Jan Masajada, Agnieszka Popiołek-Masajada, Łukasz Płócienniczak, Mateusz Szatkowski, Ireneusz Augustyniak and Sławomir Drobczyński
Department of the Fundamental Problems of Technology, Wrocław University of Technology, Wspiańskiego 27, 50-370 Wrocław, Poland
E-mail: jan.masajada@pwr.wroc.pl

KEY WORDS: optical vortex, superresolution, phase singularities

The efforts to create an optical vortex superresolution microscope (OVSM) have more than 25 years of history. During this time a few solutions have been investigated (see for examples [1,2]. Some of them proof their usability but for very narrow variety of samples. In this work we present a fresh idea for the OVSM. Figure 1 shows our experimental setup [3-4]

Moving the vortex lens (which is a spiral phase plate) causes the shift of the vortex point inside the focused laser spot. The range of this shift is remarkably reduced when comparing with the shift of the vortex lens. What is important the moving vortex point is sensitive for a small phase disturbance introduced by the sample. This effect can be used in the OVSM.

The question of the OVSM future is hard to answer at this stage of the project. Still some important problems have to be solved. However, there are reasons to believe that the OVSM can be built and these reasons will be discussed. The current project state will be also briefly presented.