OBSERVATION OF THE ROTATIONAL DOPPLER EFFECT WITH AN OPTICAL-VORTEX ONE-BEAM INTERFEROMETER

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S u m m a r y

Coherent axial superposition of Gaussian and Laguerre – Gaussian LG_0^1 modes produces an optical beam with off-axis optical vortex. The azimuth of the vortex core is a measure of the relative phase shift between the component modes, which allows one to consider such an object as an interferometer with reference and signal waves combined together in a single beam. We have applied the one-beam optical-vortex interferometer for the investigation of optical phenomena associated with the rotational Doppler effect. The frequency difference between the reference and vortex components in a beam reflected from a rotating mirror is manifested by the rotation of the position of the off-axis optical vortex. The origin of the rotational Doppler shift is attributed to the transformational properties of photons with well-defined orbital angular momentum.