

WAVEGUIDING PROPERTIES OF OPTICAL VORTEX SOLITONS

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We study the properties of linear and nonlinear waveguides induced by optical vortex solitons in both self-defocusing and self-focusing nonlinear media, for the case of a saturable nonlinear response. We demonstrate that the vortex-induced waveguides can guide both fundamental and first-order guided modes which together with the vortex may form, for larger amplitudes of the guide modes, different types of composite vortex-mode vector solitons. In the case of the self-focusing saturable medium, we demonstrate that a large-amplitude guided mode can stabilize the ring-like vortex structure which usually decays due to azimuthal modulational instability.