Selection of a LGp0-shaped fundamental mode in a laser cavity: Phase versus amplitude masks

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Abstract

Laser beams of a single high-order transverse mode have been of interest to the laser community for several years now. In order to achieve such a mode as the fundamental mode of the cavity, mode selecting elements in the form of a phase or amplitude mask are often placed inside the resonator. Such elements have the role to impose one or several zeros of intensity of the desired mode. In this paper, we consider the use of the most simple phase (amplitude) mask which is a transparent p-plate (absorbing ring) set inside a diaphragmed laser cavity for selecting a pure LGp0 mode of radial order, p. We analyse, for each type of mask, the origin of the transverse mode selection, and contrary to what one might expect we find that it is not necessary the absorbing mask that results in the highest losses.