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Fundamental Laguerre-Gaussian (LGp0) mode with lower output power threshold

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Abstract content
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Intra-cavity generation of fundamental Laguerre-Gaussian modes using a Hamamatsu spatial light modulator (SLM) as a flat-end-mirror. The digital hologram was encoded with an amplitude ring mask, which also contains an aperture of radius r . A curved mirror with a radius of curvature of $R=400$ mm and reflectivity of 98 % was used as an output coupler. For the design of the optical cavity the length of the cavity was precisely choose to be 173 mm, Nd:YAG of 25 mm as a gain median pumped by a diode laser of 808 nm wavelength was used, resulting in output wavelength of 1064 nm. Laguerre-Gaussian modes of radial order (p), from 0 to 4, were generated and considered for analysis. By digitally controlling LGp0 modes by using an amplitude mask made up of p absorbing rings with ring radii selected with zeros of the desired Laguerre-Gaussian mode. It was found that the laser efficiency for $p=1$ is the same, regardless of divisions of rings generating these modes (LGp0). In addition, lower output power threshold is recorded, when the ring(s) is(are) divided in parts N . This work demonstrate ease of generating LGp0 modes, with an aim of having a lower laser output power threshold, by dividing absorbing rings into parts.

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