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Numerical investigation of laser beam quality in thin disk laser with unstable resonator

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Abstract

In this article, M^2 factor of a thin disk laser with unstable resonator in two regimes is calculated numerically. In the first case, thermal effects are ignored and the parameters of beam width, divergence angle, radius of wave front curvature and finally, M^2 factor of laser beam are calculated by using generalized beam parameters. These calculations show that the beam quality of the laser is dependent on the resonator magnification parameter in disk laser. In the second case, thermal effects are considered. In this regime, by using analytical formula for distribution of temperature in crystal and the main contributors to the OPD, M^2 factor of thin disk laser is calculated numerically. When the thermal effects are considered, calculations show that the beam quality of thin disk laser is degraded in respect to the condition in which thermal effect was ignored, and also the output power is reduced extremely.

Keywords: M^2 factor, unstable resonator, thin disk laser, generalized beam parameters, OPD

For full article, refer to the Persian section