

Electromagnetic analysis of optimal pumping of a microdisk laser with a ring electrode

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Abstract

© 2016, Springer-Verlag Berlin Heidelberg. We study the lasing modes of microdisk lasers with ring-like electrodes or active regions, in two-dimensional (2-D) formulation. The considered eigenvalue problem is adapted to the extraction of both modal spectra and thresholds from the Maxwell equations with exact boundary conditions. We reduce it to a transcendental equation and solve it numerically. The obtained lasing frequencies and the associated values of threshold material gain of the ring-pumped laser are compared with similar quantities of the fully active microdisk. This comparison shows that the optimal position of the active ring is shifted inward from the disk rim. Its location and width can be used as an engineering instrument to manipulate the thresholds. This effect is explained using the optical theorem and overlap coefficients.

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