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Development and investigation of tunable multicolour superbroadband solid state and dye lasers

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Lasers emitting simultaneously several wavelengths can be widely used in scientific and applied investigations. For their successive application it is necessary to ensure broad spectral region where independent tuning of lasing lines is possible and to get high output power. In this paper intracavity losses are studied in multicolour dye lasers with violated modes competition [1]. It is shown that increase of the losses of radiation emitted by active medium off-axis portions not only decrease the output energy, but also is the main reason limiting lasing spectrum width of such lasers. Novel optical schemes of multicolour laser's cavities are suggested with decreased geometrical losses. Application of new resonators permits to widen the lasing spectrum of polychromatic dye lasers up to 2 times. Spectral and energetic characteristics are investigated of developed lasers with different dye solutions as an active medium. Superbroadband solid state lasers are constructed on the base of developed cavities. The width of the continuum radiated by such laser with an active medium made from a crystall of LiF with colour centers is operatable. It can be from 2 nm up to 60 nm. An active element was pumped by Q-sweatched ruby laser. Continuum of 15 nm wide was emitted also by the laser with lamp pumping (Nd doped glass GLS-22 was used as an active medium in this case). Violation of modes competition in such lasers with homogeneously broadened amplification band of active medium permits to get the continuum up to 1 - 2 orders wider than that of conventional lasers with nondispersive cavities. Such a broad continuum can be useful for application of the developed lasers for absorption measurements. The ability and advantages are discussed of multicolour lasers application in molecular spectroscopy, holography, biology, medicine, holographic interferometry, diagnostic of complex physical objects.

Literature

- [1] Izmailov A.M., Zhiglinskiy A.G. // Vestnik LGU (Sov), v.4, N.25, p.71-73, 1992.