

Optical Quality Control of Gas Flow Laser Active Mediums

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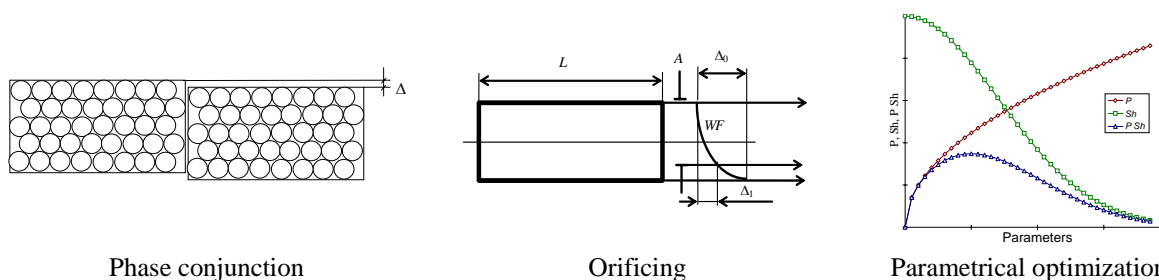
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Features of active mediums (AM) forming in high power gas flow lasers (GDL, CWCL, COIL) are considered. The main common moments in the process of optical heterogeneous streams forming are determined. It's shown that passive correction of AM heterogeneities allows decreasing level of phase aberrations.

It's well known that in GDL, CWCL, COIL large volumes of AM are formed by nozzle bank with small-scale nozzles. Expansion ratio of nozzles is such that Mach number is 2...5. Gasdynamic heterogeneities in the resonator volume are connected with shock-wave structure, viscous interaction zones and mixing of different components with different thermodynamic and optical characteristics.

These process together lead to destroying of refractive index distribution and, as a consequence, to phase aberrations of laser beam. It's possible to determine regular heterogeneities with periodical spatial scale which depends on geometrical configuration of nozzle bank. In GDL the turbulence of flow is possible. In this case the stochastic heterogeneities will appear. The analysis of deferent spatio-temporal scales is fulfilled in this work [1].

The new conception of passive correction of phase aberrations is considered. It concludes in not complex modification of laser construction, choice optimal parameters of laser that provide increasing of laser efficiency. The most effective variants of passive correction are phase conjunction, orificing and parametrical optimization of laser.



Provided numerical and experimental interferometrical investigations are make possible not only to show detail structure of AM flow in optical cavity GDL [2], CWCL [3] and COIL [4], but to get quantity information about aerooptical gas-flow quality along laser forming direction including dependence of Strehl number and complex laser efficiency on geometrical factors and regime parameters.

The detail results of passive correction using for GDL, CWCL and COIL are presented. It's interesting that the conception of passive correction can be using for high-scale solid-state lasers too.

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