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Erratum

Polarization state selection and stability in a laser with a polarization-isotropic resonator; an example of no lasing despite inversion above threshold (Optics Comm. 117 (1995) 244)

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An error in the paper has been brought to our attention [1]. The formulas given for the instability threshold for the circularly polarized steady state solutions and the frequency of the Hopf bifurcation at that instability threshold are incorrect and should be corrected as follows.

The critical value of the pump parameter σ above which the circularly polarized single mode solutions are unstable is given by

$$\sigma_{\mathrm{cr-circular}} = 1 + \frac{\gamma_c(3\gamma_c + \gamma_{||})(\kappa+1)(\kappa+1+\gamma_c)}{\gamma_{||}[2\kappa(\kappa+1) + \gamma_J(\kappa-1-\gamma_c)]}.$$

At this critical value there is a double Hopf bifurcation involving the onset of the orthogonally polarized field at optical sidebands shifted from the frequency of the steady state solution which is resonant with the atomic transition. The frequency shift of the sidebands at the start of the instability (the frequency of the Hopf bifurcation), Ω_c, is given by

$$\Omega^2_{\mathrm{c-circular}} = \frac{2\kappa\gamma_c(\kappa+1)(\gamma_J-\gamma_c)}{[2\kappa(\kappa+1) + \gamma_J(\kappa-1-\gamma_c)]}.$$

Numerical solutions seem to indicate that this is a subcritical bifurcation and that the time dependent solutions above this instability threshold involve strong emission of both circularly polarized components with time dependent amplitudes. The optical spectrum is predominantly bichromatic on average with one orthogonally (circular) polarized component shifted to a frequency above the atomic frequency and the other shifted below [2,1]. The orthogonally polarized components have equal equal spectral power, though in general their amplitudes are time dependent [2,1].

We are grateful to Woerdman, Schrama and van Eijkelenborg for bringing the first of these errors to our attention.

References

[1] J.P. Woerdman, C.A. Schrama and M.A. van Eijkelenborg, private communication.

[2] N.B. Abraham, M. Matlin and R.S. Gioggia, Phys. Rev. A, manuscript under review.

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