Frequency stabilization of a He-Ne longitudinal Zeeman laser

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Abstrak

ABSTRACT
The principles of frequency stabilization is to keep constant the optical path length in laser cavity by controlling the laser- tube length. In this system used temperature servo control to control the laser tube length.

As reference to an error derived by a sensitive frequency discriminator. Basically the operation of this sensitive frequency discrimantor utilized the longitudinal Zeeman Laser, which splits atomic gain profile.

When a longitudinal magnetic field is applied to an internal mirror of single mode He-Ne Laser, the active medium acquires a negative circular dichroism. There fore the intensity of the left cicular polarization (LCP) output of the, laser will be different from the intensity of the right circular polarization (RCP) output and only when the two are simmetrically disposed about the center line will their intensities be equal. This intensity difference as feedback can be detected by passing the output beam throught Wallaston prism and the two orthogonally polarized beams are received by two identical photodiodes. The difference between the output of photodiode as amplified and the resulting signal is passed throught a system controller (PID) before it is fed back as heating or cooling current of peltier elements. This current controls the resonator length thermally and lock the laser frequencies of the two polarized beam symmetrically on either side of the profile.