

## عنوان مقاله:

Frequency stabilization of ambience-isolated internal-mirror He–Ne lasers by thermoelectric-cooling thermal compensation

## محل انتشار:

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## خلاصه مقاله:

An approach for frequency stabilization of an ambience-isolated internal-mirror He–Ne laser (632.8 nm) utilizing temperature control of the laser tube with Peltier thermoelectric coolers is demonstrated. Measurements indicate that there are an optimal temperature (23 °C) and an optimal discharge current (5.5 mA) of laser tube for which the laser light power is separately maximized. To prevent the effect of fluctuation of discharge current on the laser stability, an adjustable current source is designed and fabricated so that the current is set to be optimal ( $5.50 \pm 0.01$  mA). To isolate the laser tube from the environment, the laser metallic box connected to two Peltier thermoelectric coolers is surrounded by two thermal and acoustic insulator shells. The laser has two longitudinal modes very often. Any change in the frequency of longitudinal modes at the optimal temperature is monitored by sampling the difference of longitudinal modes' intensities. Therefore, using a feedback mechanism, the current of thermoelectric coolers is so controlled that the frequency of modes stays constant on the gain profile of the laser. The frequency stability is measured equal to  $1.17 \times 10^{-9}$  (~2700x) for less than 1 min and  $2.57 \times 10^{-9}$  (~1200x) for more than 1 h.

## کلمات کلیدی:

Frequency stabilization Optimal temperature Peltier thermoelectric cooler Ambience-isolated He–Ne laser

## لینک ثابت مقاله در پایگاه سیویلیکا:

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