

Characterization of TEA carbon dioxide laser

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Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=81169&lokasi=lokal>

Abstrak

ABSTRACT

The carbon dioxide laser is one of the most versatile types on the market today. It emits infrared radiation between 9 and 11 micrometer (μm) either at a single line selected by the user or on the strongest line in untuned cavities. It can produce continuous output power output powers ranging from well under 1W for scientific applications to many kilowatts for material working.

It can generate pulses from the nanosecond to millisecond regimes. Custom made CO₂ lasers have produced continuous beams of hundreds of kilowatts for military laser weapon research (Hecht 1984) or nanosecond long pulses of 40 kilo joules (kj) for research in laser induced nuclear fusion (Los Alamos National Laboratory 1982).

This versatility comes from the fact that there are several distinct types of carbon dioxide lasers. While they share the same active medium, they have important differences in internal structure and more important to the user in lunch oral characteristic. In theory the structural variations could range over a really continuous spectrum, but manufactures have settled on a few standard configurations which meet most user needs. This users see several distinct types, such as waveguide, low power sealed tube, high power following gas, and pulsed transversely excited CO₂ lasers.

On TEA lasers discharge instabilities make continuous wave operation impractical at gas pressures above about 100 torr (13,3 MPa). How ever it is possible to produce pulses lasting tens of nanosecond to microseconds. Such lasers are called transversely excited atmospheric (TEA) lasers because they operate at or near atmospheric pressure, although same times the term is applied to pulsed transversely excited CO₂ lasers which operate at higher or lower pressures. The TEA lasers prime attraction of high power per unit volume of laser gas and have fairly complex power requirements because of the nature of their pulsed operation. Typically same energy in the form of electrons or ultraviolet photons is discharged into the laser gas slightly before the main pulse to make it possible to obtain higher output power. In this thesis, basic theory of the Carbon dioxide laser are presented in section II.

Section III describe Optical Transducer. Section IV contains the characterization of carbon dioxide laser with the results and graphs.

Finally some conclusion regarding our discussion are summarized in section V.