

PROBING THE ENVIRONMENTAL POLLUTION WITH GaAs LASER

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ABSTRACT

This paper describes an electro-optic system for probing the environmental pollution. In order to study the concentration of the environmental pollutants in the atmosphere, a LIDAR system was developed, based on a GaAs laser, operating at 0.9 microns. The choice for this type of emitter at the first stage was in its simplicity of operation, the compactness of the system and the total small weight.

The two main units of this system — the transmitter and the receiver — are mounted close to each other. In this configuration the back scattered signal is received and analyzed by means of a photoelectronic discriminating and gating solid state circuitry.

In the first phase of this development, the instrument was operated at a constant wavelength, and cloud (or pollutant) density was detected. The transmitting beam is collimated within 2 millirad., and the instrument has a gating ability and so recognizing depth within an accuracy of ± 5 m. This provides the possibility of getting the overall three dimensional profiling of the pollution.

At the operating wavelength, the main scattering in the atmosphere is of the Mie type, so that the system was especially applicable at places where dust from factories is concerned.

The emitted peak power was 200 watts, and detection of pollutants over a distance of 800 meters was achieved.

Preliminary field measurements with this system demonstrated the possibility to detect and to map in 3-D the concentration of the pollutants.