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[1] An error has crept into the derivation of formula (18) of [3], which is analogous to our formula (1). In particular, the flux of gravitational radiation from an artificial explosion under the conditions of [3], was underestimated in error by 16 orders of magnitude.

OBSERVATION OF SELF-FOCUSING OF LIGHT IN LIQUIDS

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In 1962 G. A. Askar'yan considered one of the important problems involved in the effect of a beam of intense radiation on a medium. He has shown that intense radiation can lead to a differential between the properties of the medium inside and outside the beam. The latter creates conditions suitable for waveguide propagation of the beam, thereby eliminating the geometrical and diffractional divergences. This interesting phenomenon was called by him self-focusing of an electromagnetic beam.

It was shown in [2] that the action of a strong high-frequency field on a plasma causes redistribution of the electron and ion concentrations and therefore gives rise to a waveguide channel that supports the action of the field itself.

Garmire, Townes and Chiao [3] discuss in a recent note the possibility of self-focusing of light beams as a result of the fact that the increment of the refractive index of the medium has an approximate quadratic dependence on the field amplitude:

$$n = n_0 + n_2 E^2; \qquad n_2 > 0 \tag{1}$$

This can create conditions under which the radiation becomes self-focused and propagates in the medium within a thin filamentlike channel. Because of the field of the wave itself, the refractive index is larger inside the channel than outside, and the light remains confined to the channel as a result of the total internal reflection.

An interesting result obtained in [3] is that self-focusing can occur only when the light-beam power exceeds a threshold value. The channel diameter depends on the power excess above threshold; it can be quite large when the excess is small, and is of the order of the wavelength when the excess is appreciable.

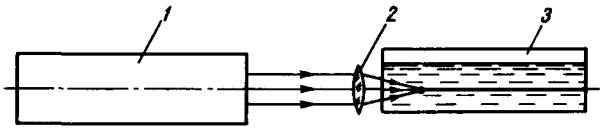

Fig. 1. Set-up for the observation of self-focusing. 1 - Laser, 2 - lens, 3 - cuvette.

The set-up used by us to observe self-focusing of light is shown in Fig. 1.

The laser was Q-switched and its power was of the order of 20 MW. A lens of 28 mm focal length focused the laser radiation onto a cuvette filled with different organic liquids. The glow was observed from the side of the cuvette and from the end opposite the lens.

The laser radiation, which was self-focused into a narrow filament, left a distinct trace, in the form of a point, on photographic paper fastened to the end of the cuvette. The glow pattern of this filament was photographed from the side of the cuvette (Fig. 2).

Fig. 2. Glowing channel in cyclohexane

Fig. 3. Orthoxylol; two glowing filaments are seen

The cuvettes were filled with toluene, cyclohexane, orthoxylol, and carbon tetrachloride. Self-focusing was observed in all four liquids in the Q-switched mode. No effect was observed when the laser was operated without Q-switching, for the radiation power was below threshold.

These preliminary data point to the following two features:

1. Self-focusing can occur ahead of the lens focus, and not necessarily on the lens axis. Then only a small fraction (~ 1%) of the total laser energy can propagate along the resultant channel. According to rough preliminary estimates, the transmitted power amounts to 0.2 MW (compared with 0.25 MW for organic substances in [1]).

2. Several filaments, say two or three, are sometimes produced (see Fig. 3).

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