Click here for Full Issue of EIR Volume 11, Number 24, June 19, 1984

one of the others. Two beams "pump" the medium from exactly opposite planar directions (Figure 2). The third beam (the probe) is the beam to be conjugated; it enters the medium at the required angle, interacts with it and then pumps so that its conjugate beam is produced. In DFWM, the power of the pumps and the probe determines the power of the output conjugate beam so that it is possible with the combination of high-power pumps and low-power probe to achieve a "reflected" conjugate of greater power than the probe. So far, conjugates have been produced with powers 100-fold greater than their probes.

Applications

Optical phase conjugation can be used for any laser application that requires long-distance transmission through inhomogeneous media, e.g., laser communications with submarines, or directed energy weapons. In an application designed by the Fusion Energy Foundation (Figure 3), the attack sequence against a ballistic missile in its boost phase is initiated by a small laser aboard an orbiting mirror spacecraft:

1) The spacecraft directs its beam downward through the atmosphere to the earth-bound conjugator and amplifier.

2) On the ground, the arriving pulse passes through a laser amplifier enroute to the conjugator. The pulse is conjugated and amplified on its second pass to missile-kill intensities.

3) The pulse travels upwards to deflect off the orbiting mirror at the appropriate angle to intercept the target.

There are other characteristics of optical phase conjugation useful for directed-energy weapons and other systems. For example, since the output conjugate beam follows the probe beam exactly, the conjugate beam can remain locked on target (e.g., an orbiting mirror) without the use of complicated pointing and tracking mechanisms.

Finally, we note that optical phase conjugation is based on the existence of a harmonic relationship between energy transitions in different materials and the spectrum of wavelengths of electromagnetic radiation. Fisher (see reference 2) presents a table of over 300 materials appropriate as conjugators across a spectrum of wavelengths from 10.67 to 0.25 microns. Materials vary from water to crystals to gaseous mercury.

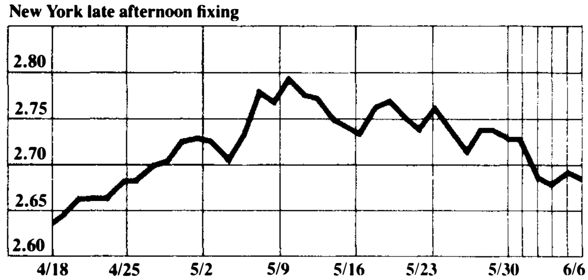
References

1. *Laser Focus/Electro-Optics*, September 1983, pp. 12-14.
2. Robert A. Fisher, "Phase Conjugation Materials," to appear in *CRC Handbook of Lasers*.
3. C. R. Giuliano, "Applications of Optical Phase Conjugation," *Physics Today*, April 1982.
4. Barry J. Feldman, et al., "Through the Looking Glass with Phase Conjugation," *Los Alamos Science*, Fall 1982, p. 9.

Currency Rates

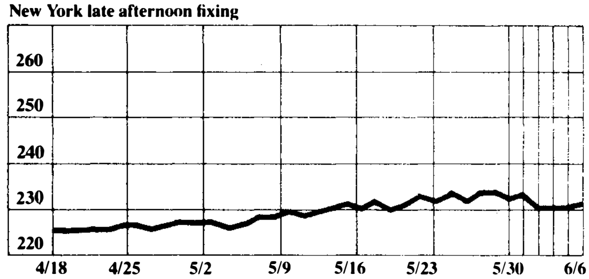
The dollar in deutschemarks

New York late afternoon fixing



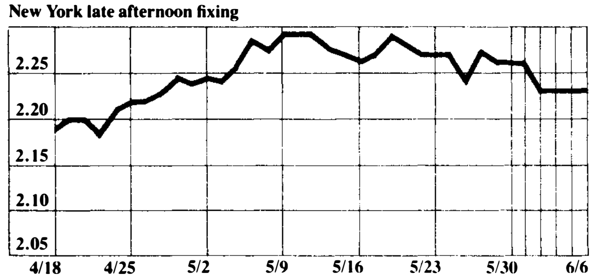
The dollar in yen

New York late afternoon fixing



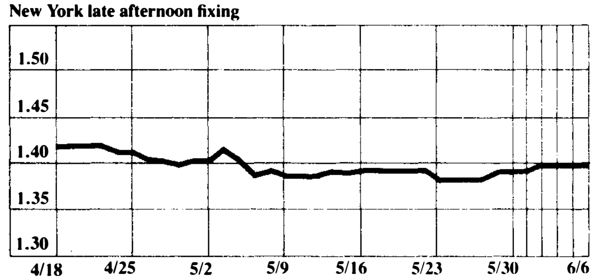
The dollar in Swiss francs

New York late afternoon fixing



The British pound in dollars

New York late afternoon fixing



© 1984 EIR News Service Inc. All Rights Reserved. Reproduction in whole or in part without permission strictly prohibited.