

Fig 5.1. The amplitude of the electric field vectors of the transmitted, amplified, and reflected waves in a Fabry-Perot system containing an amplifying (or absorbing) medium. The absorption factors A_1 , and A_2 are not used explicitly in the analysis given in the text, but they modify the values of t_1 and r_1 .

Fig. 5.3. Saturation of gain of a homogeneously broadened transition by a monochromatic signal whose intensity increases from 1→2→3.

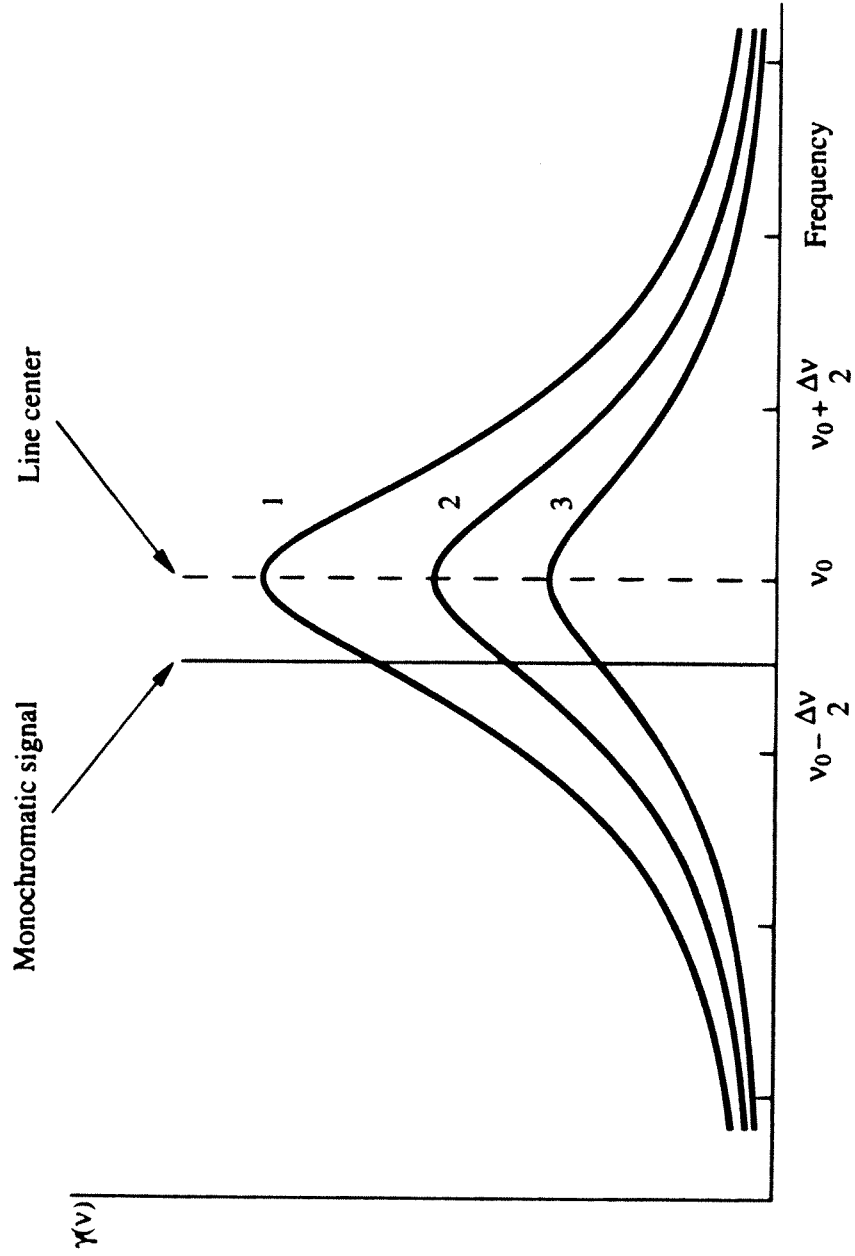


Fig. 5.4. Schematic illustration of the onset of oscillation at cavity resonances that lie above the loss line in a homogeneously broadened laser.

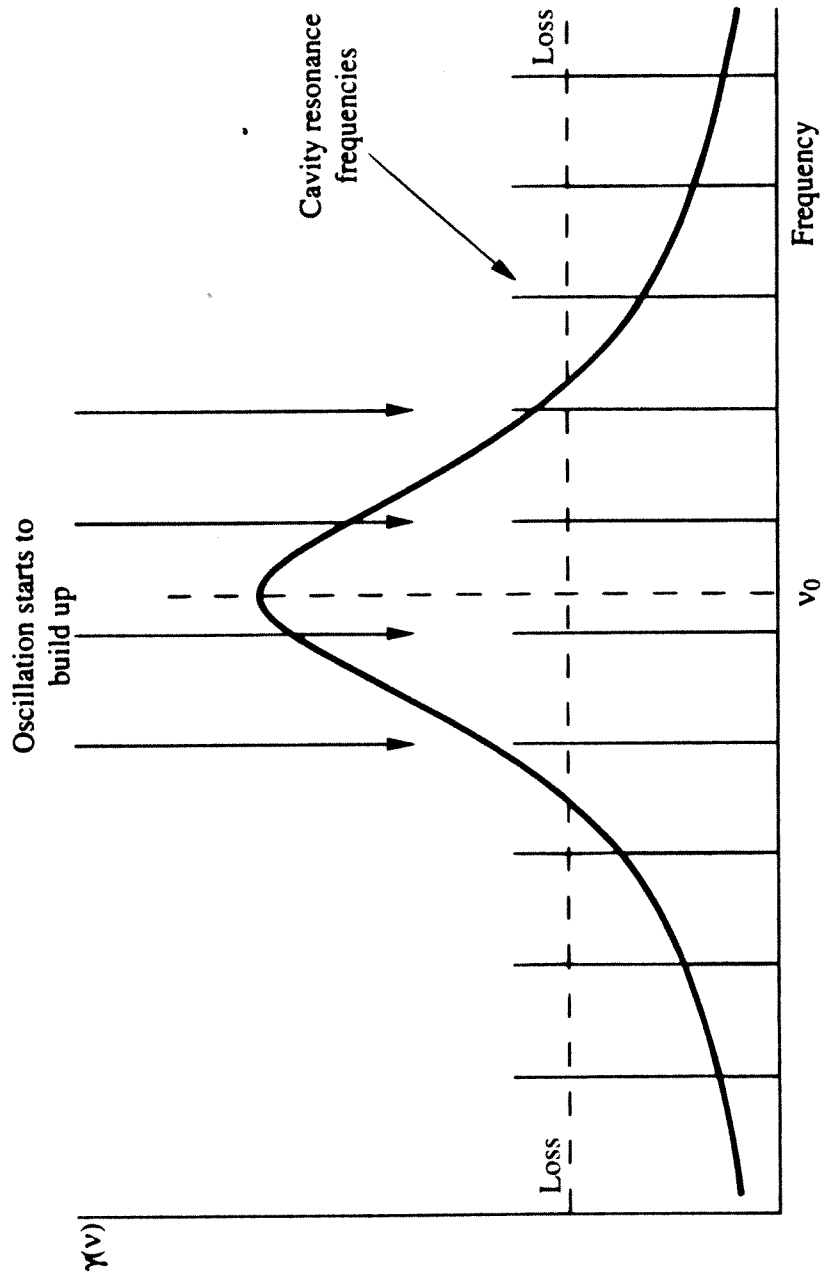


Fig. 5.5. Oscillation building up in a homogeneously broadened laser. Gain saturation has already suppressed oscillation at two of the cavity modes that were above the loss line in Fig. (5.4).

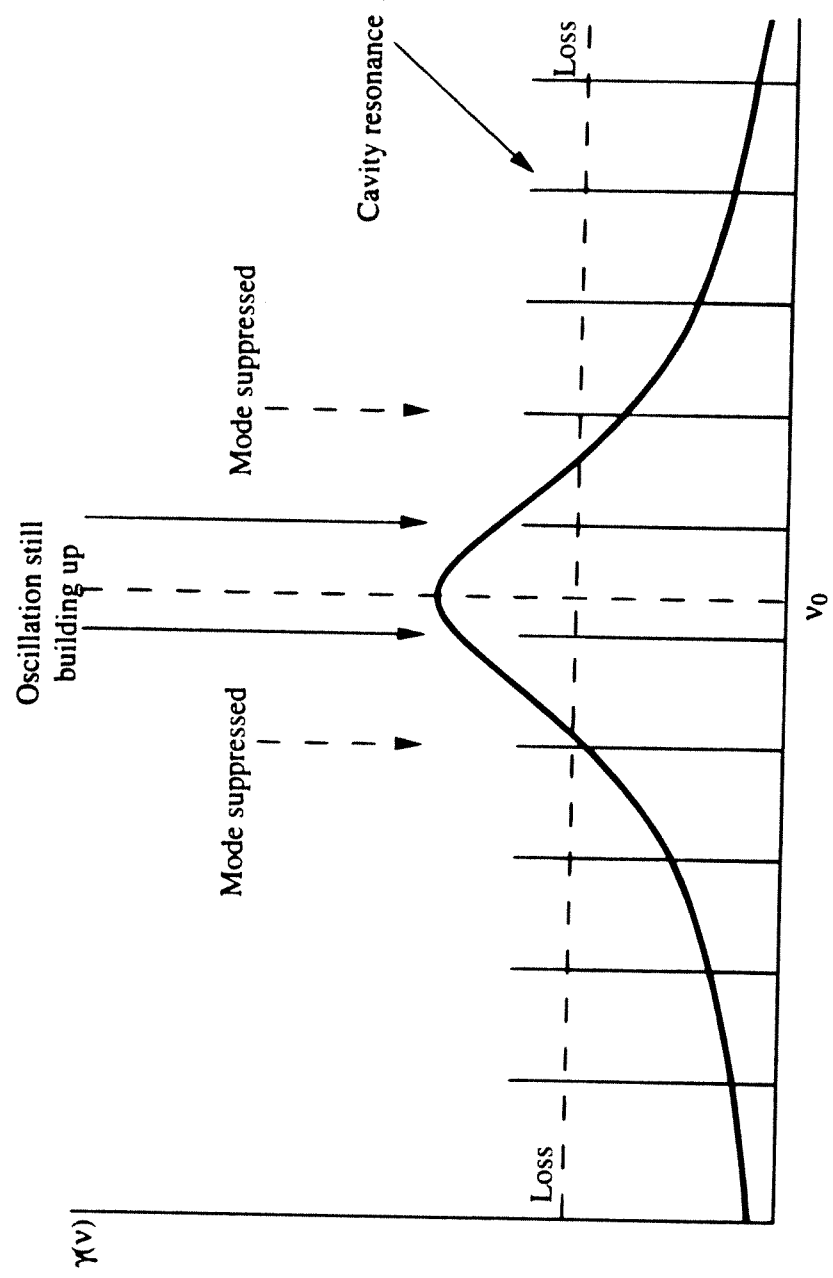


Fig. 5.6. Oscillation stabilized in a homogeneously broadened laser. The gain has been uniformly saturated until only one mode remains at the loss line.

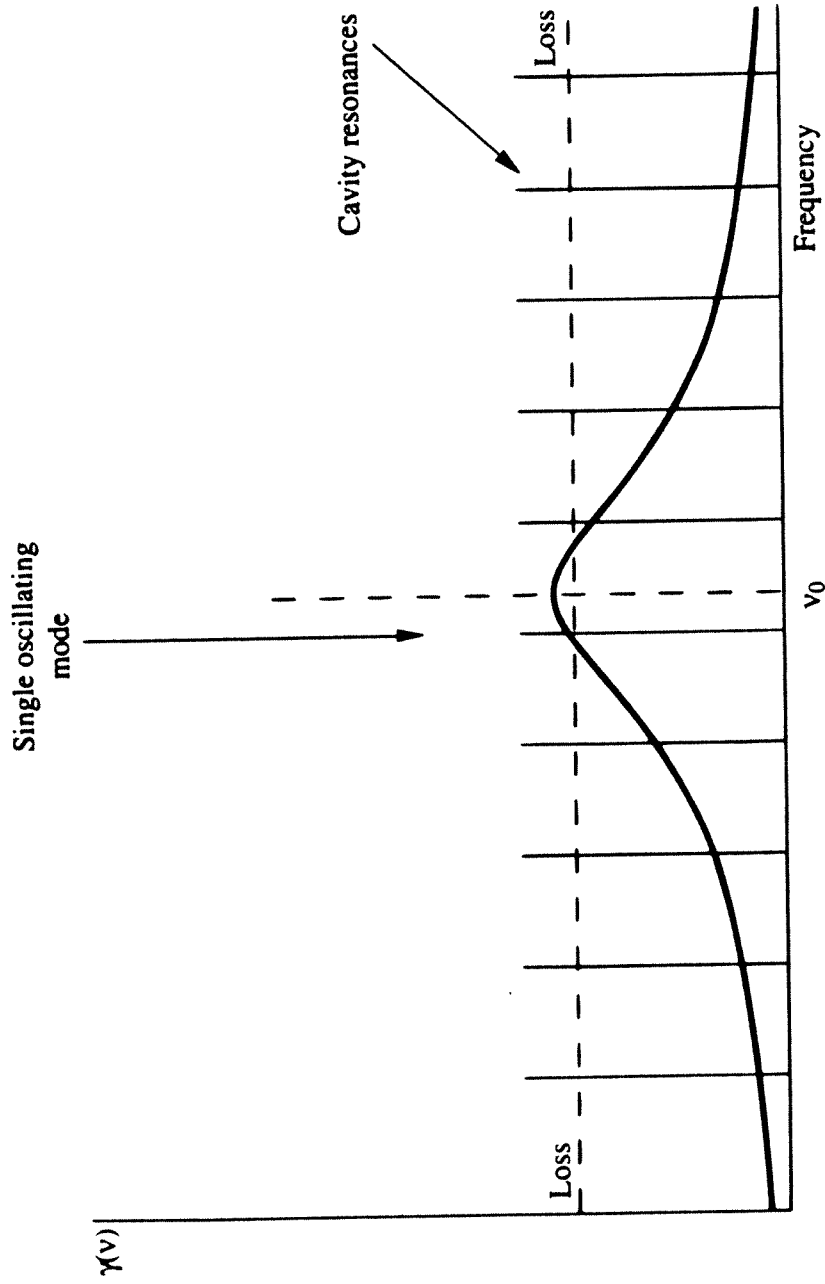
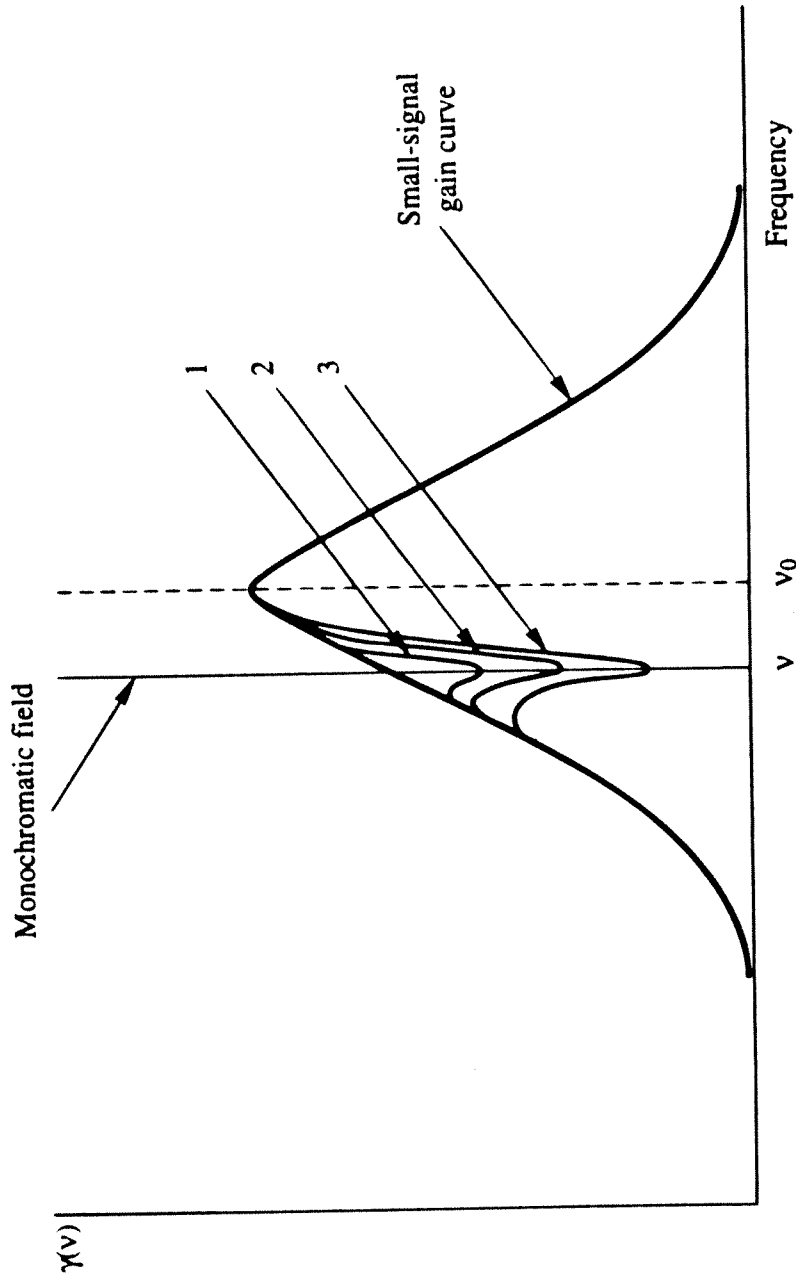


Fig. 5.7. Localized gain saturation in an inhomogeneously broadened amplifier produced by a monochromatic signal whose intensity increases from 1 \rightarrow 2 \rightarrow 3.



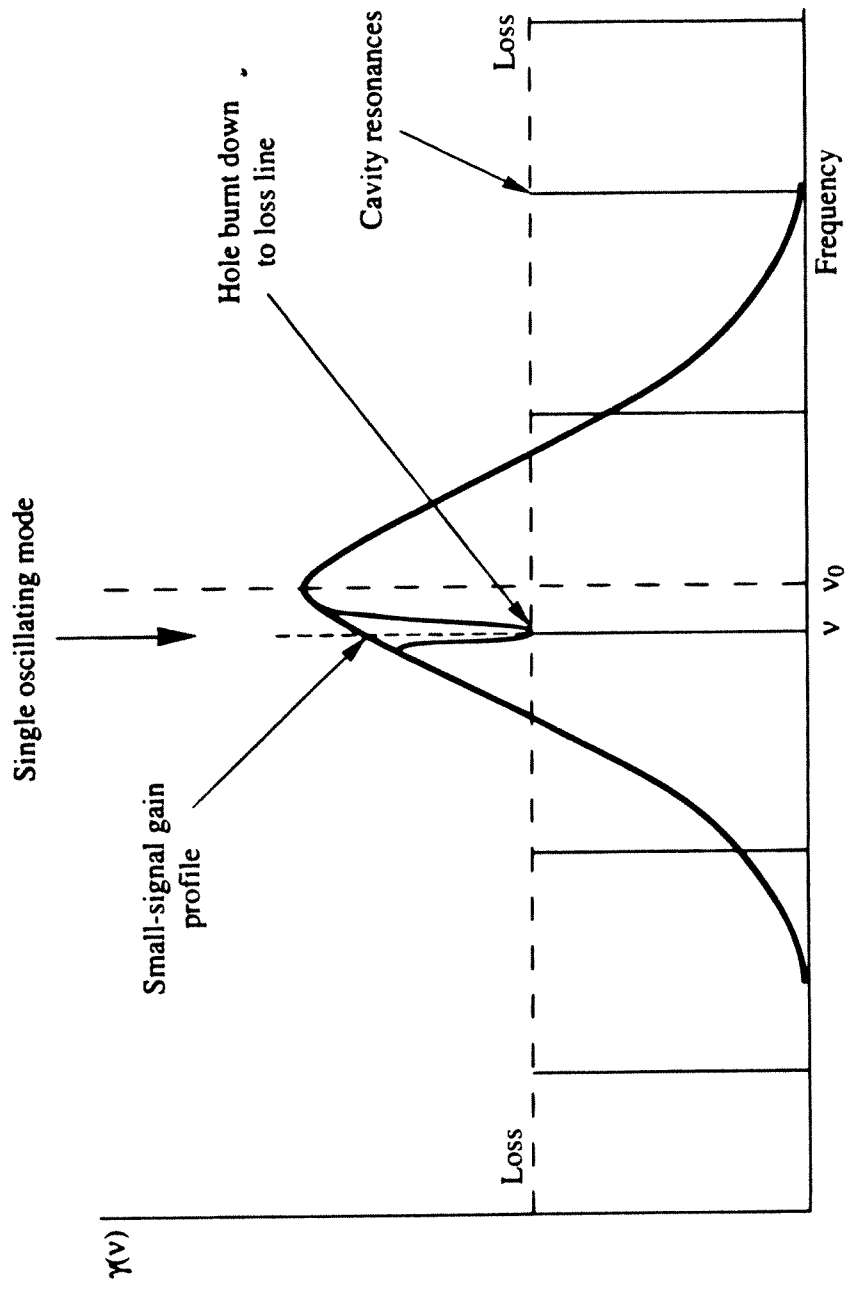


Fig. 5.8. Simplified illustration of stabilization of oscillation at a single longitudinal mode in an inhomogeneously broadened laser.

Fig. 5.9. Production of two holes in the velocity distribution of a collection of amplifying particles by a single cavity mode.

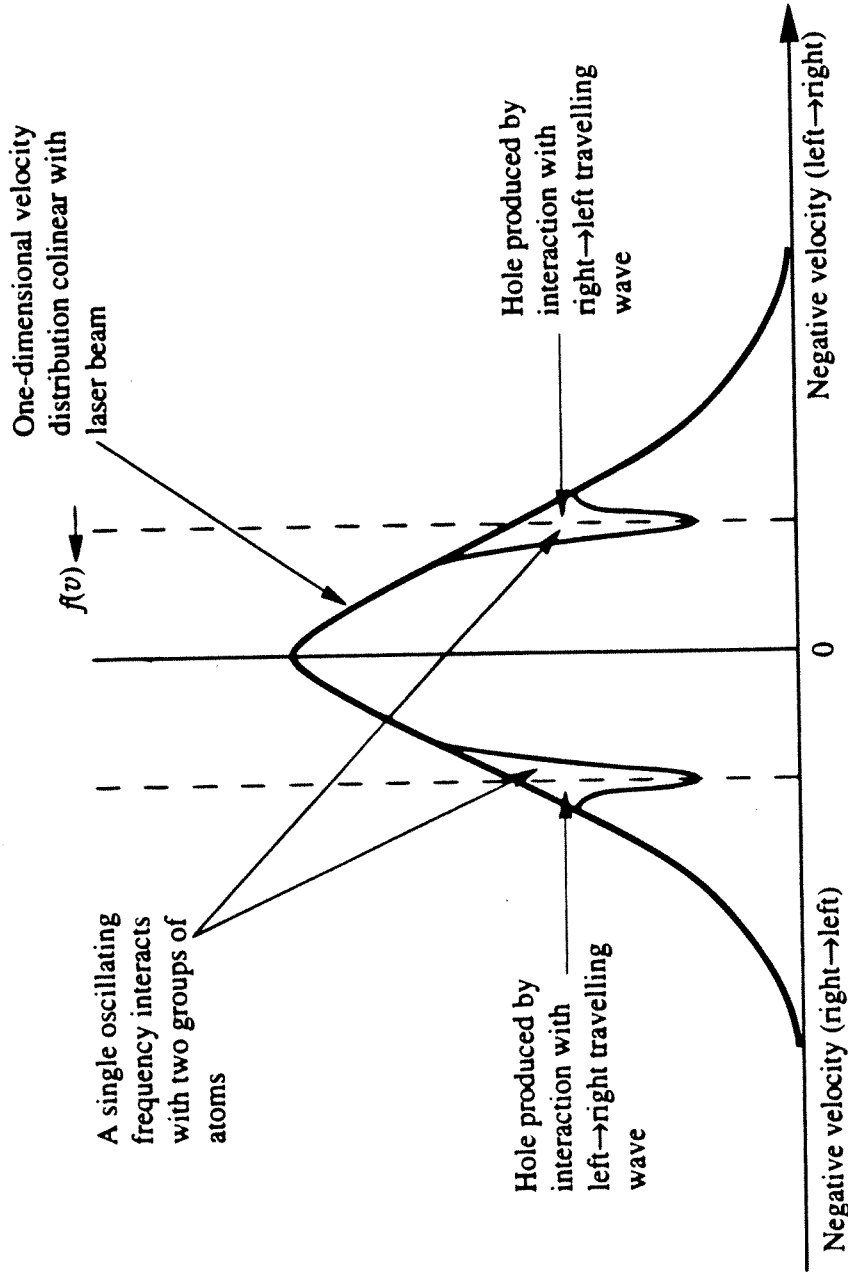


Fig. 5.10. Stabilization of a single longitudinal mode in an inhomogeneously broadened laser.

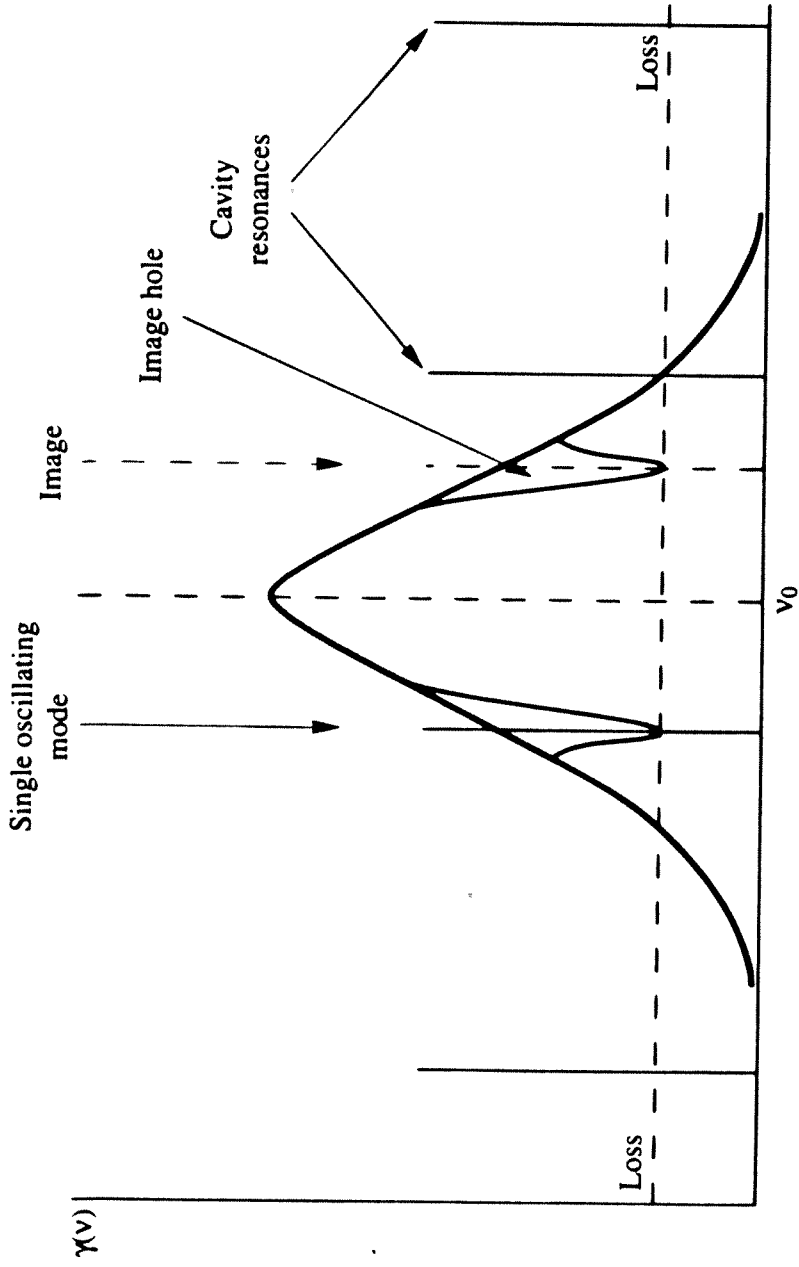


Fig. 5.11. The Lamb dip – a reduction in the intensity of a single oscillating longitudinal mode in an inhomogeneously broadened laser as its frequency is scanned through line center.

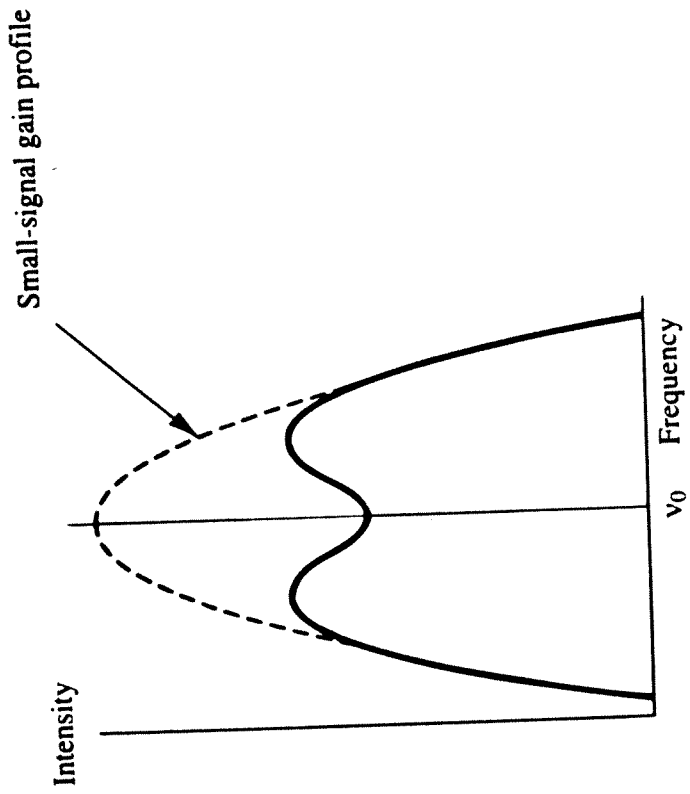


Fig. 5.12. Multi-longitudinal-mode oscillation in an inhomogeneously broadened laser. (a) Only the primary holes are shown burnt down to the loss line. The image holes are not shown. (b) Schematic laser output spectrum.

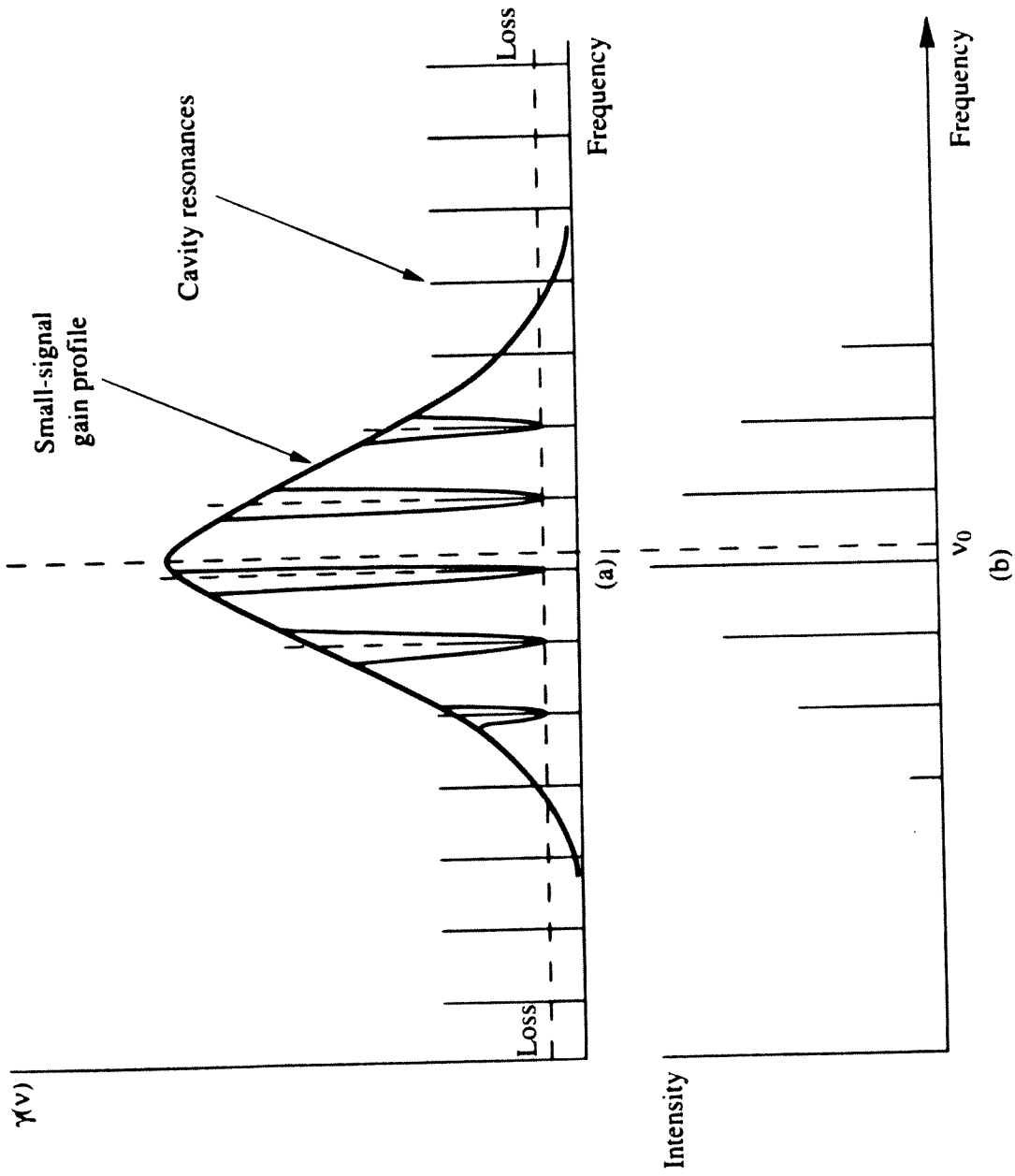
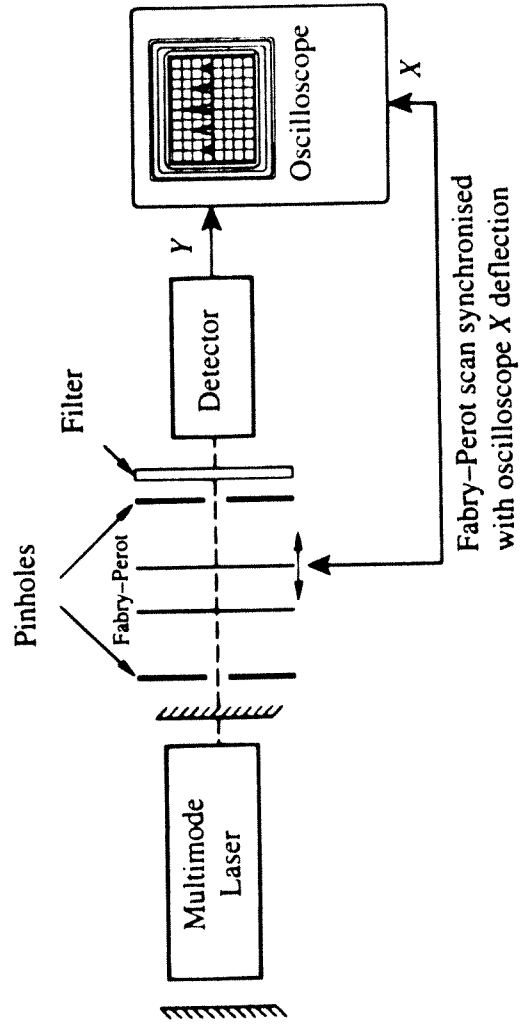
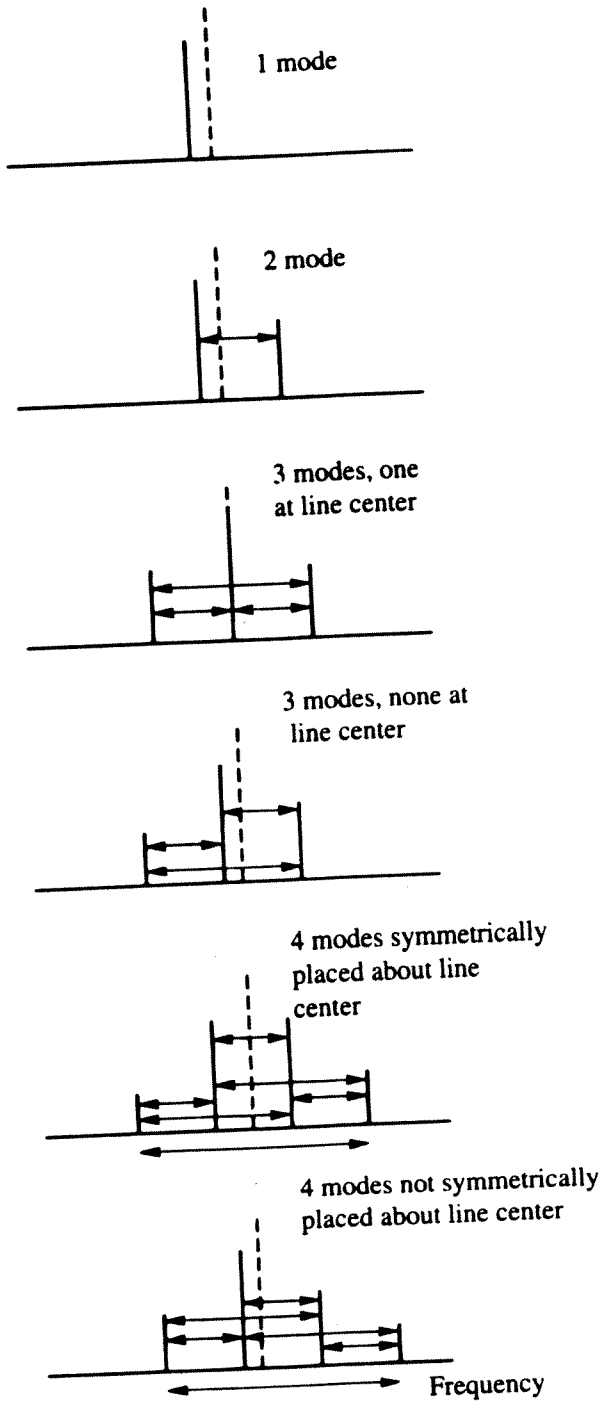


Fig. 5.13. Experimental arrangement with a scanning Fabry-Perot interferometer for observing multi-mode laser oscillation.



Laser output spectrum



Beat spectrum

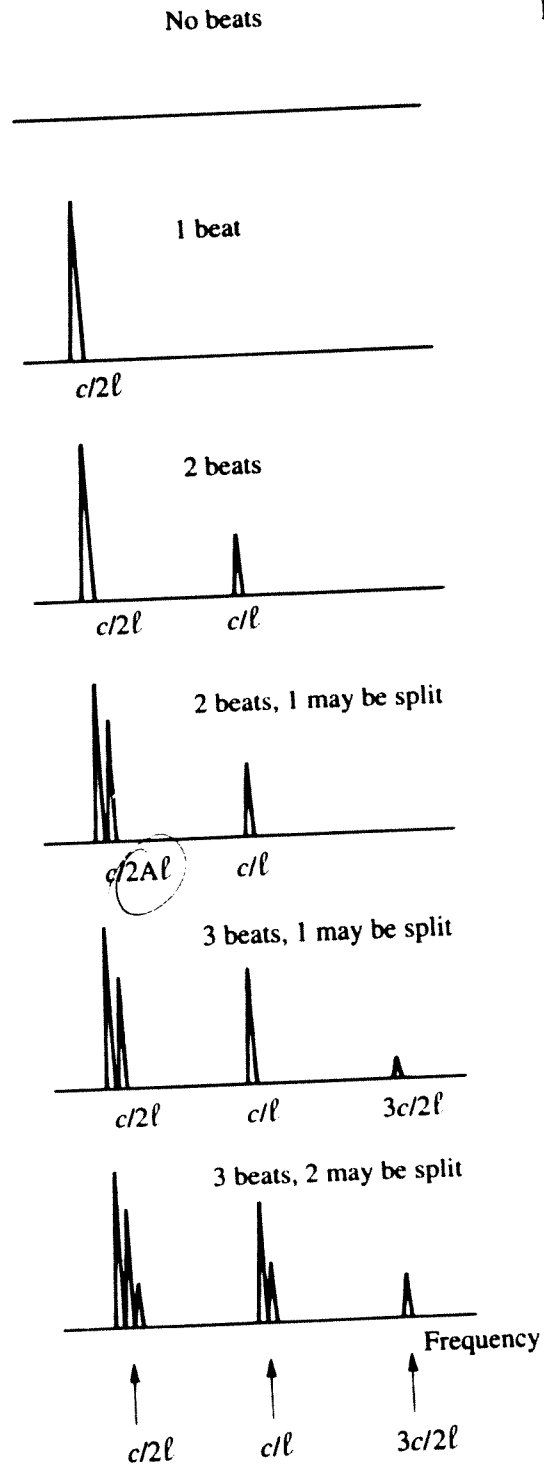
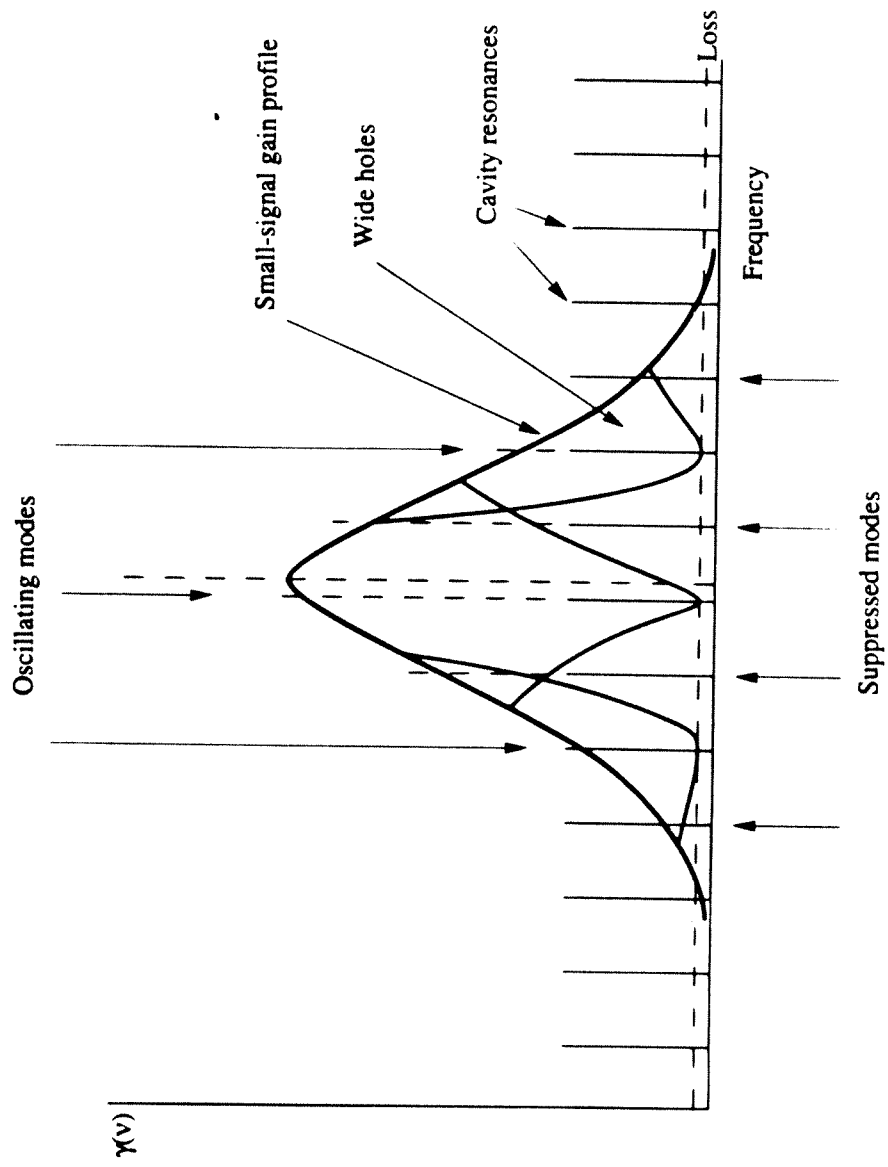


Fig. 5.14. Schematic mode-beating spectra observed with a square-law detector and a multimode laser.

Fig. 5.15. Schematic illustration of mode competition in an inhomogeneously broadened laser in which there is significant homogeneous broadening.



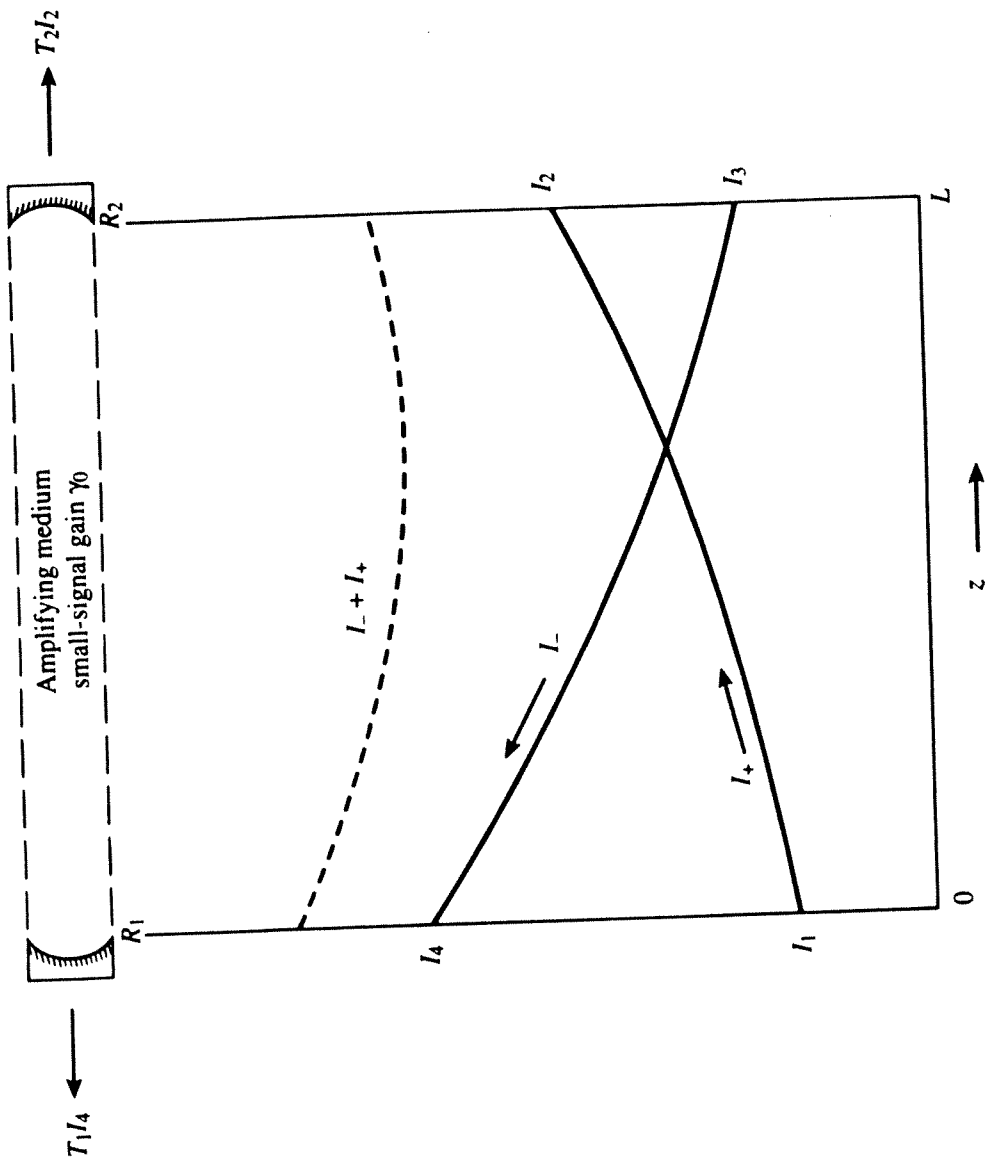


Fig. 5.16. Distribution of wave intensities in an oscillating laser cavity with unequal laser intensities.

