

## Chapter 12&13

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1-Assume a laser that is working in low optical power:

The Medium is located between two mirrors of  $R_1= 100\%$  and  $R_2$ . The gain coefficient of the medium is  $0.2 / \text{cm}$  and the internal loss coefficient of the cavity is  $0.09 / \text{cm}$ .

- a) Derive an expression for mirror loss ( $\delta_e$ ) that will give maximum output power
- b) Calculate the mirror reflectivity  $R_2$
- c) Calculate the gain threshold
- d) Drive the equation (expression) for the output power

### 2- Problem 12.3.5

A low gain cavity laser with homogeneously saturable laser medium is oscillating in an axial mode located exactly at line center. A separate laser signal of intensity  $I_1$  tuned exactly to line center is also sent through the same laser mirrors at a very slight angle so that this external signal misses the laser mirrors but illuminates exactly the same volume of atoms as the oscillation signal inside the laser cavity. Develop an expression for the oscillation power output through the end mirrors of the laser cavity as a function of the externally injected signal level and the usual laser parameters