

Nonlinear Electromagnetism

TD n°8

Optical bistability

The aim of this problem is to calculate the transmission of a Fabry-Perot cavity, filled with a lossless centrosymmetric nonlinear medium (gaz or liquid), with a linear refractive index n_0 , in order to show that bistability can be obtained.

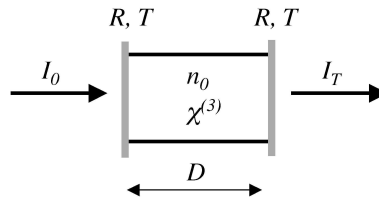


FIG. 1 – *Nonlinear Fabry-Perot.*

1. The considered process is caused by a third order nonlinearity. Which effect can it be in order for the medium to be lossless?
2. Solve the nonlinear wave equations using the slowly varying envelope approximation for the forward and backward waves propagating in the Fabry-Perot cavity.
3. After having written the boundary conditions, give the final expression of the Fabry-Perot transmission as a function of the transmitted intensity.
4. Graphically show that the system exhibits bistability