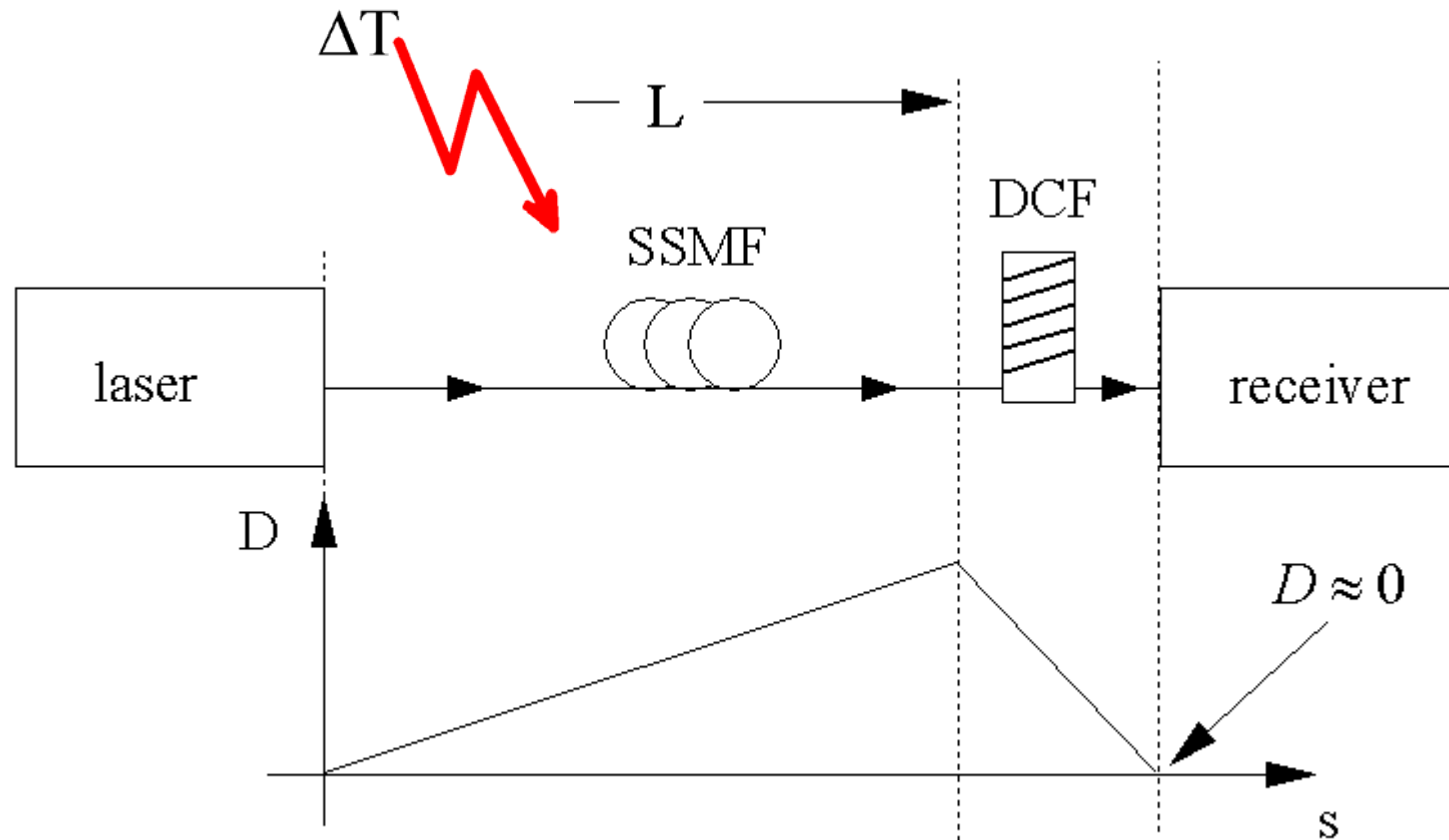

Simulation of an AWG Structure with thermal Lens for adaptive Dispersion Compensation using a BPM Algorithm

F. Kerbstadt, C.A. Bunge, K. Petermann



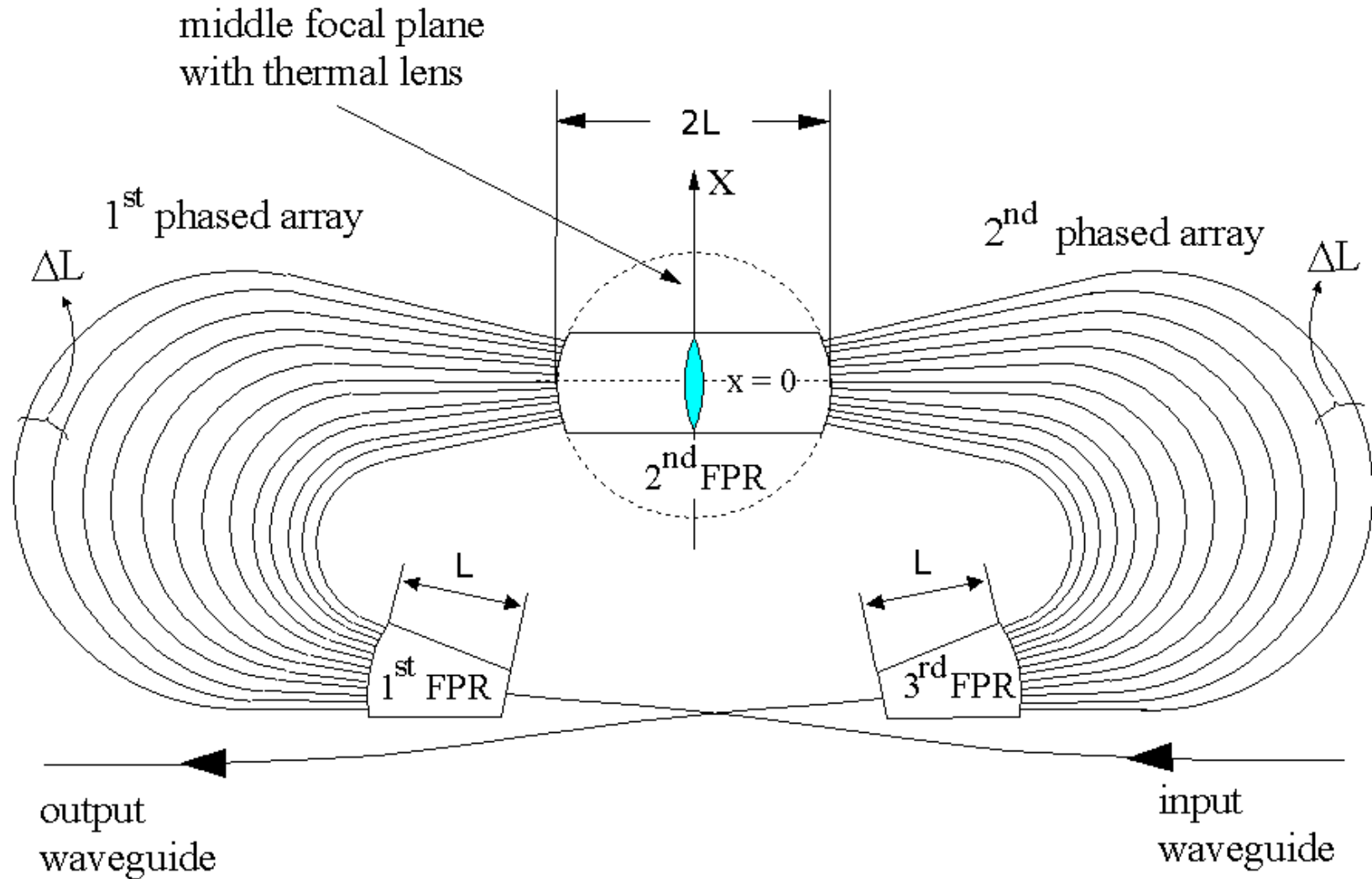
motivation



Outline

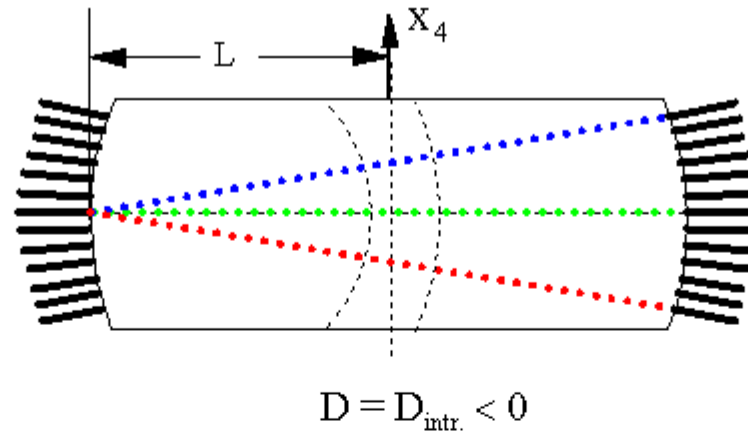
- structure and principle of operation
 - waveguide concept
- thermal lens
 - thermal model
- model for the calculation of the transfer function
- results
- conclusion

the structure

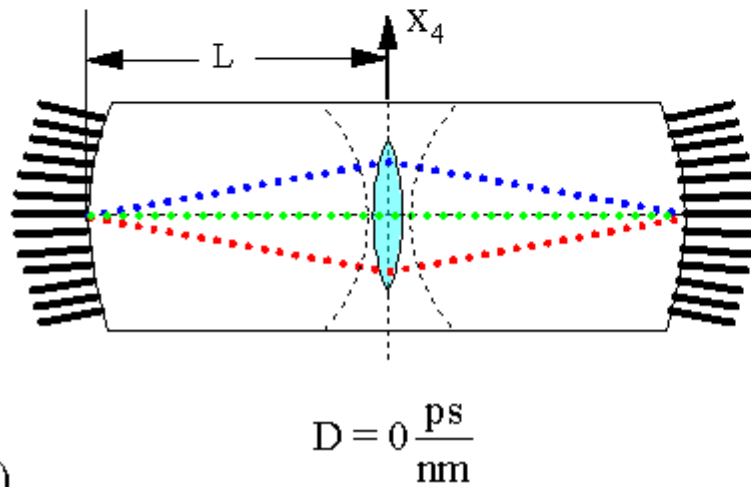




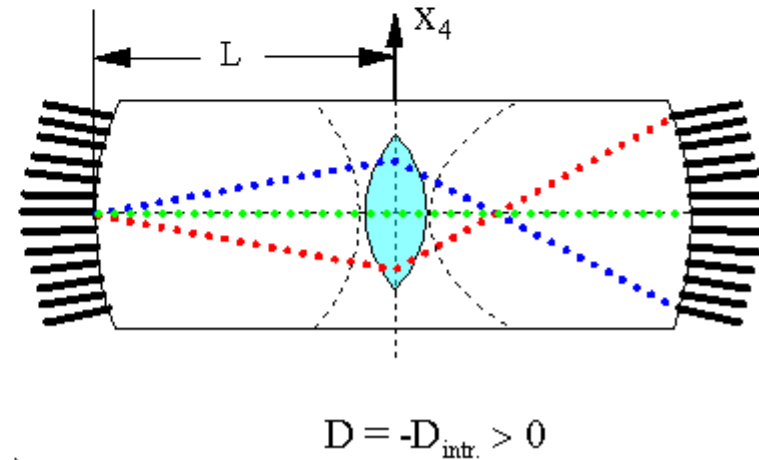
lens operation



a)



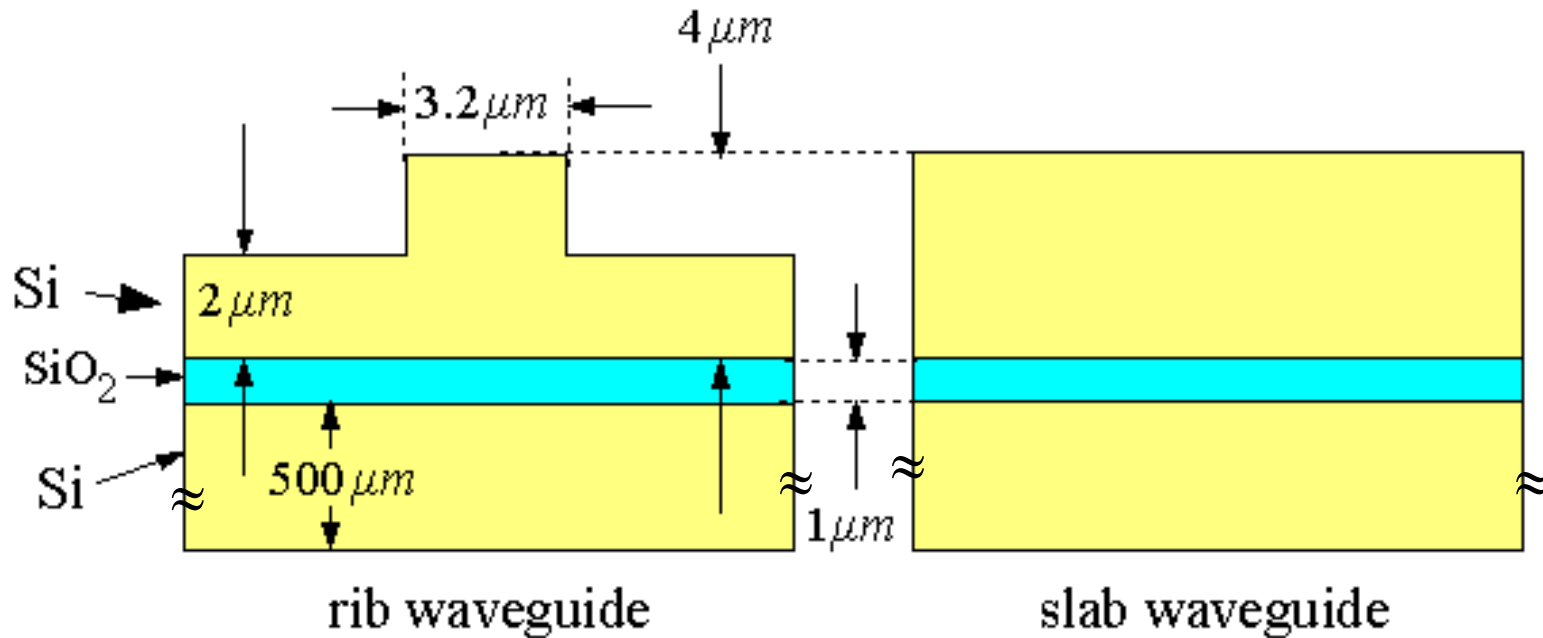
b)



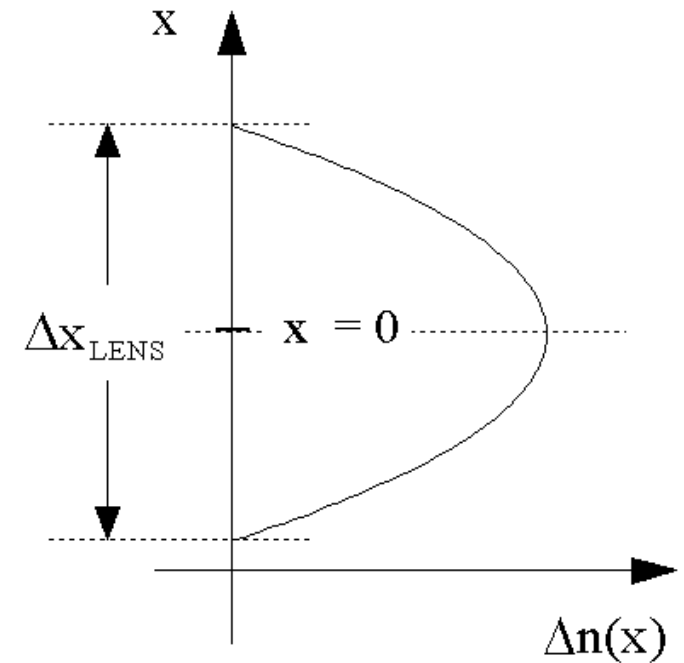
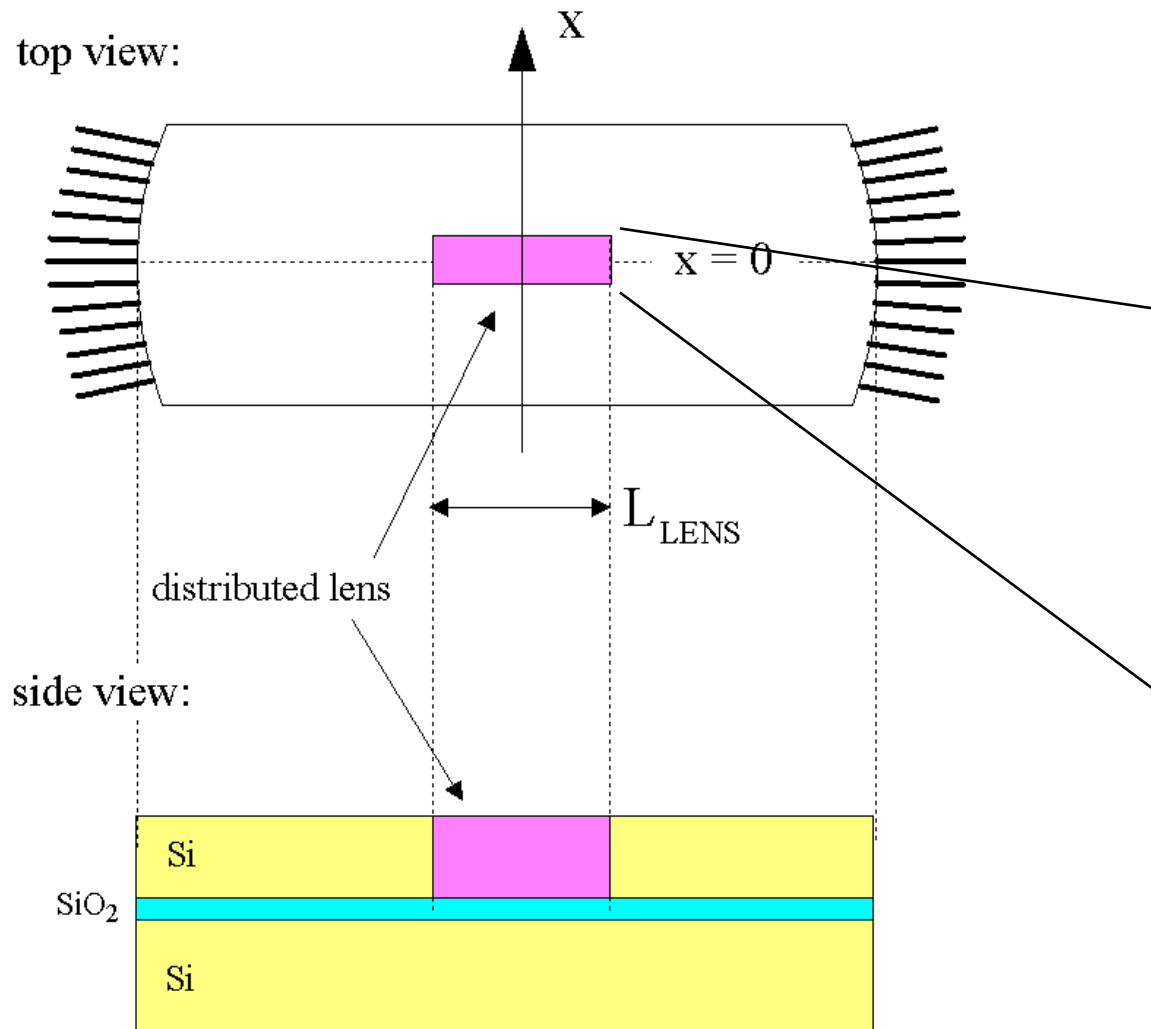
c)

waveguide concept

Silicon On Insulator (SOI)



lens principle

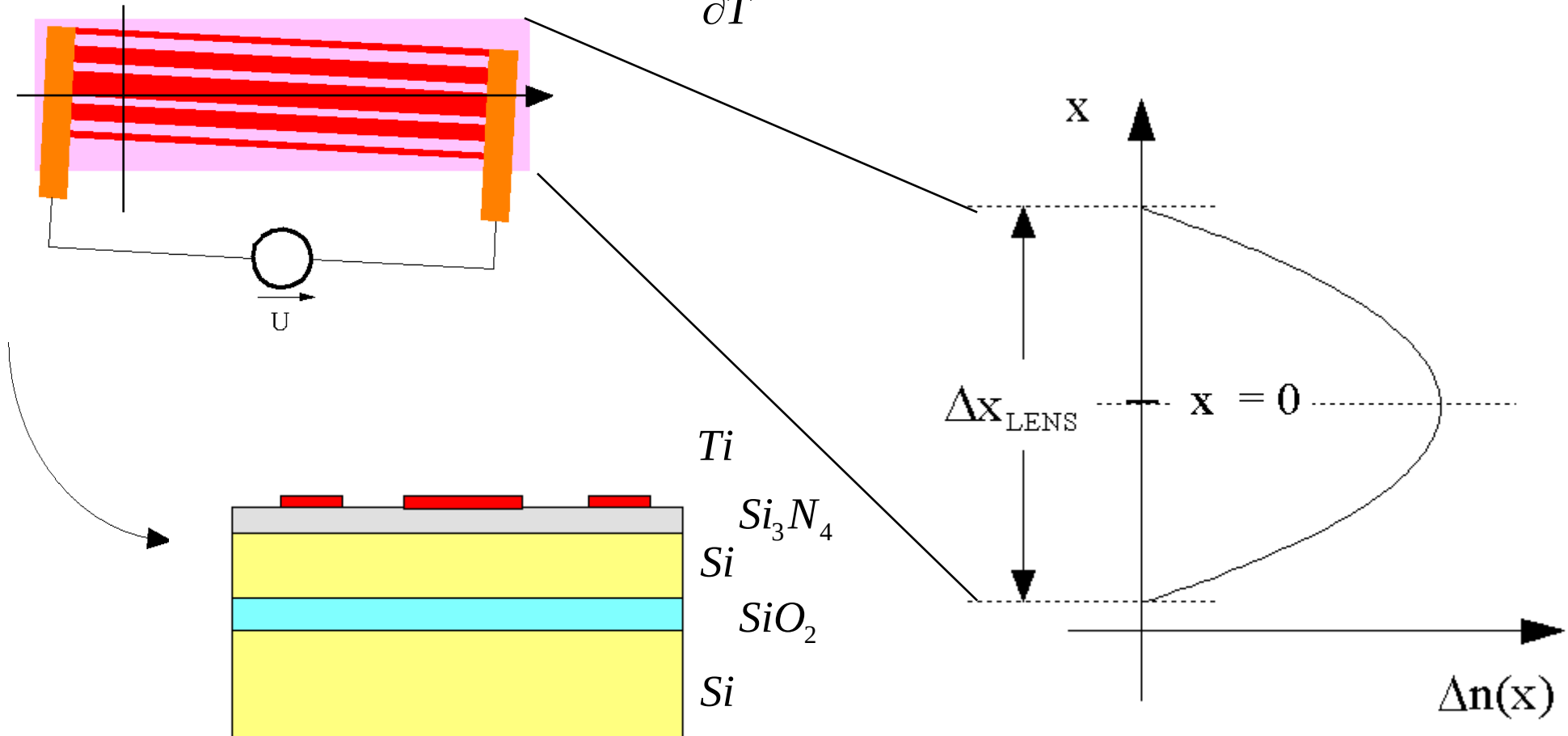


$$\Delta x_{LENS} = 80 \mu m$$

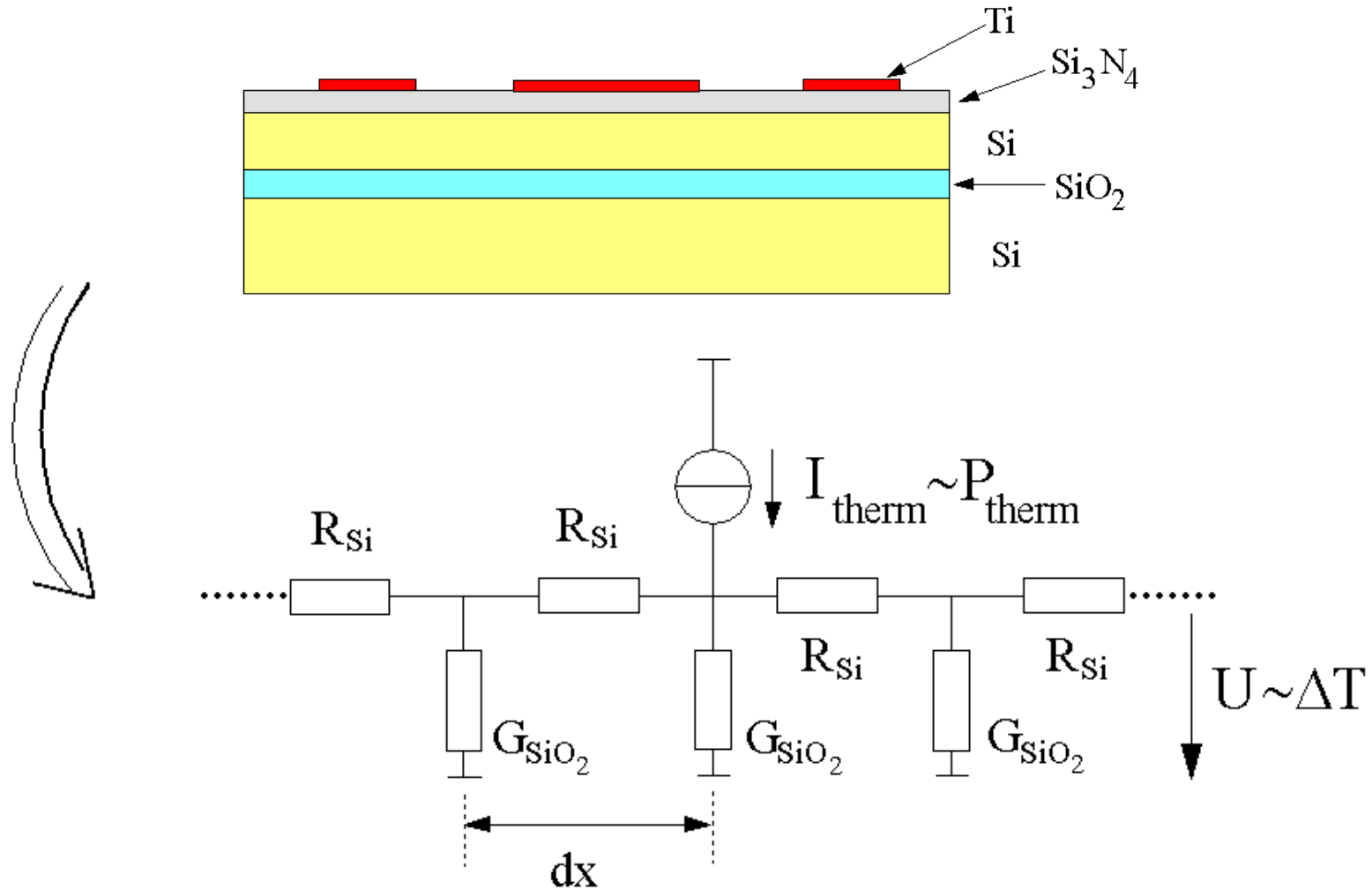
$$L_{LENS} = 800 \mu m$$

lens realization

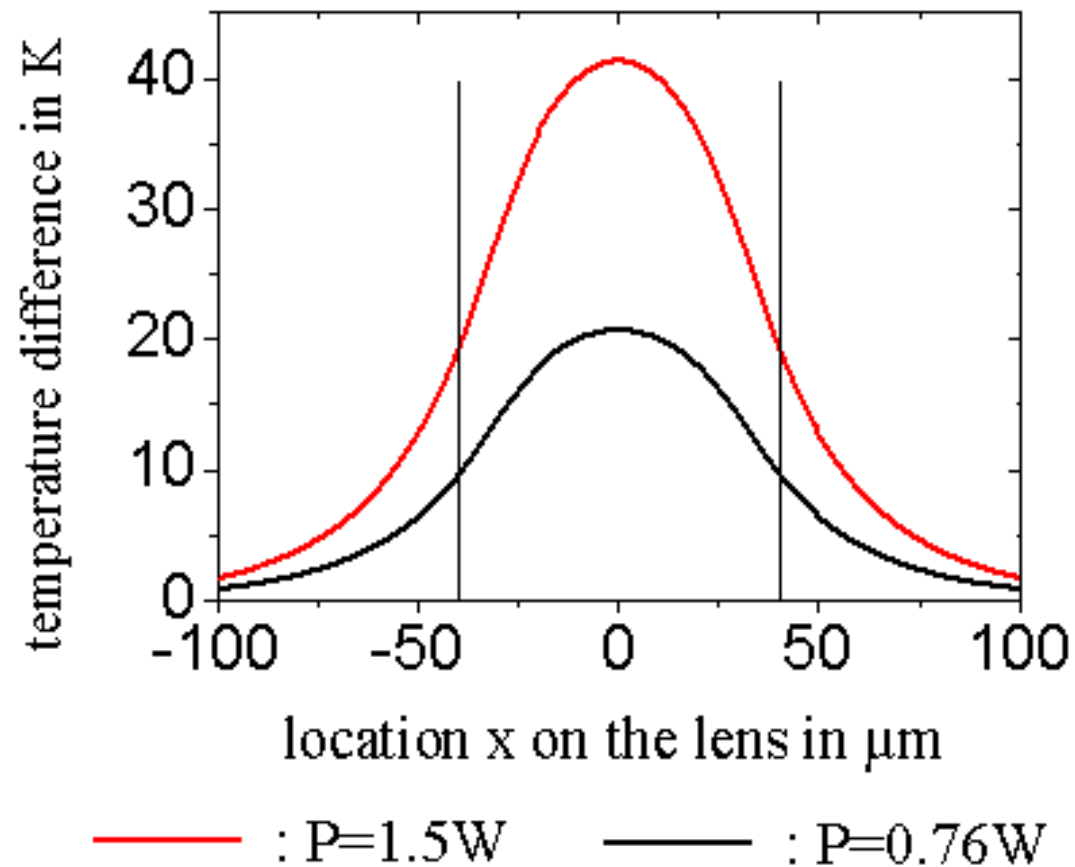
$$\frac{\partial n_{Si}}{\partial T} = 1.86 \cdot 10^{-4} K^{-1}$$



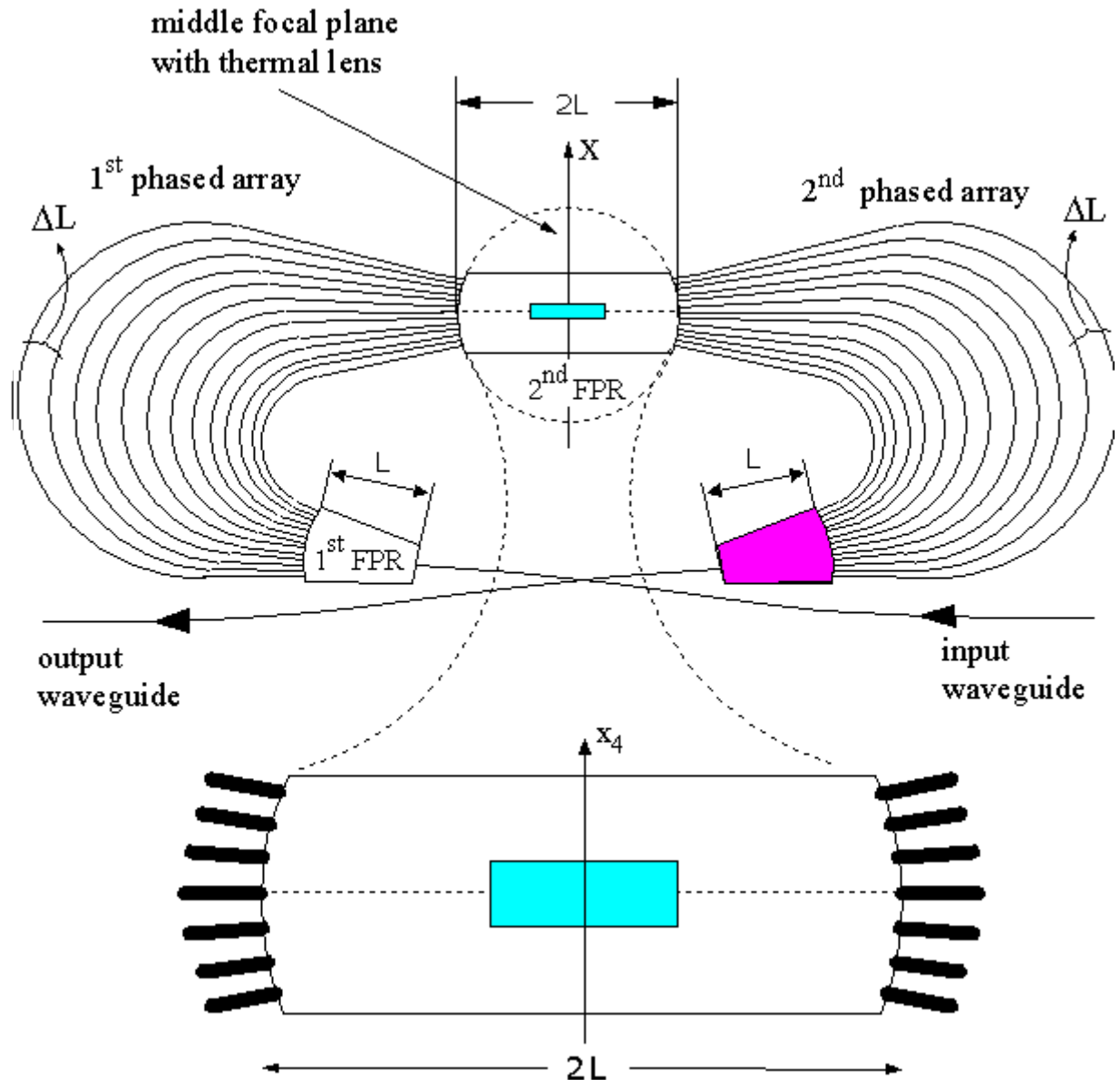
thermal model



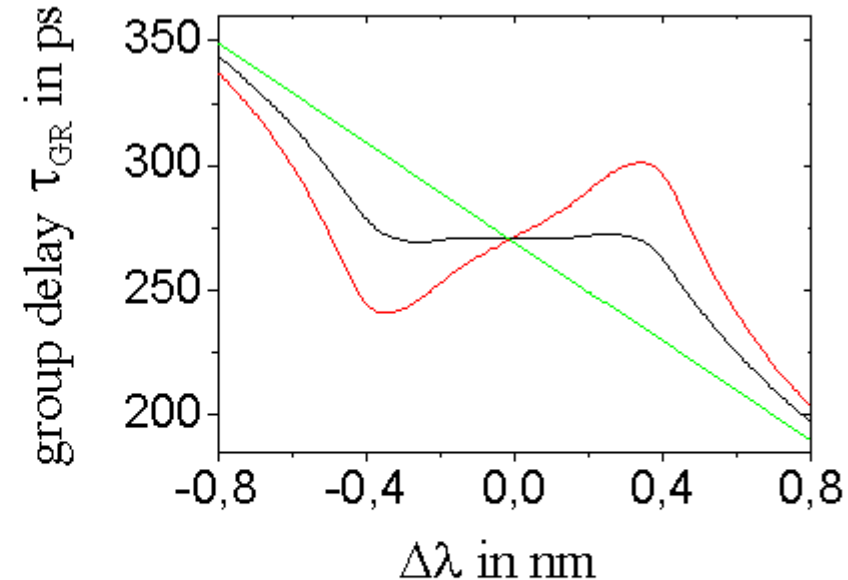
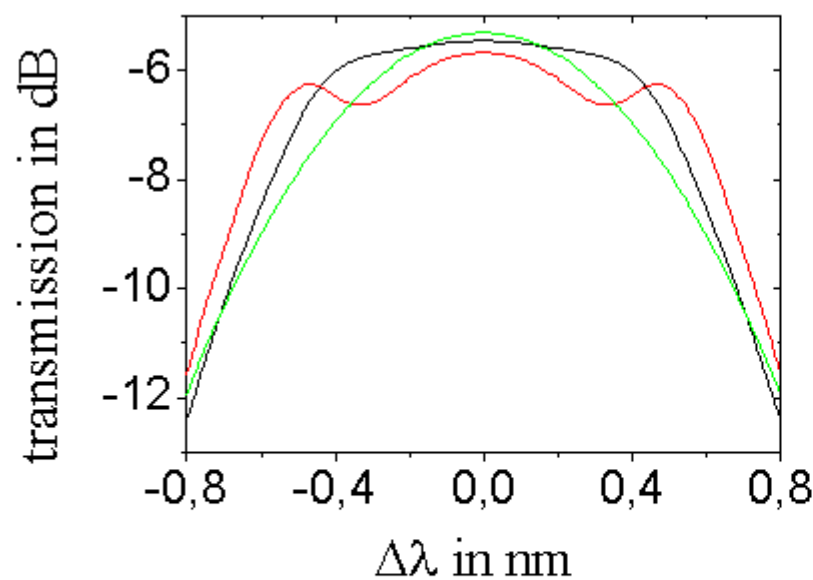
thermal distribution



- Kirchhoff-Huygens-Integral
- phase shifting function
- Kirchhoff-Huygens-Integral
- BPM
- Kirchhoff-Huygens-Integral
- phase shifting function
- Kirchhoff-Huygens-Integral



transfer function

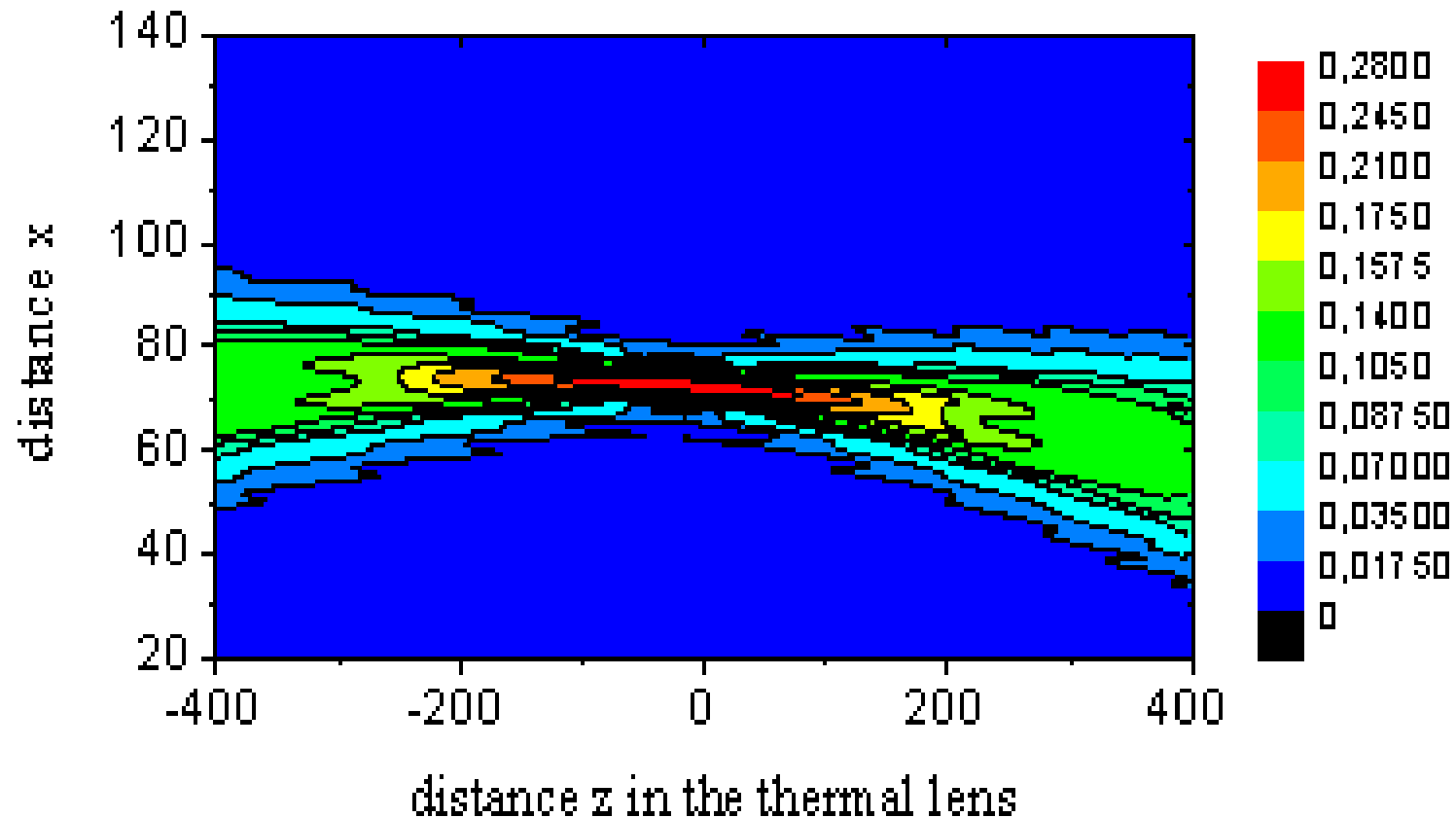


—	:	P=1.5W	—	:	P=0.76W	—	:	P=0W
		D=+90.6ps/nm			D=+3.1ps/nm			D=-100ps/nm
		D _{theor.} =+126.2ps/nm			D _{theor.} =+19.6ps/nm			D _{theor.} =-100ps/nm

flattening effect

BPM calculation, $P=3W$, $\Delta\lambda=0.8\text{nm}$

color: normalized electrical field strength



Conclusion

- structure and principle of operation were shown
- thermal lens and thermal model were explained
- the numerical method to calculate the transfer function of the whole structure was explained
- the transfer function was shown
- using the results of the BPM calculation, the flattening effect was explained