

Trace Gas Sensor Modeling

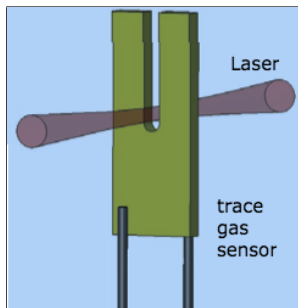
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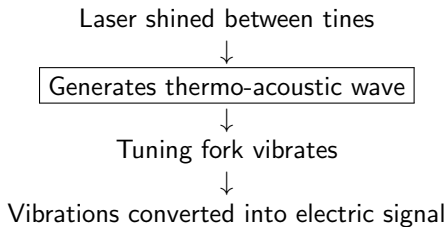
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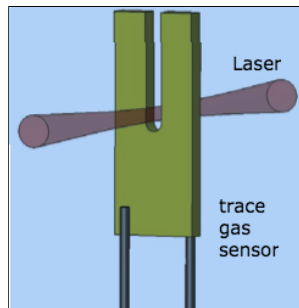
Trace gas sensors are designed to detect the quantity of certain atmospheric particles such as carbon monoxide, methane, etc.



Source: Noemi Petra



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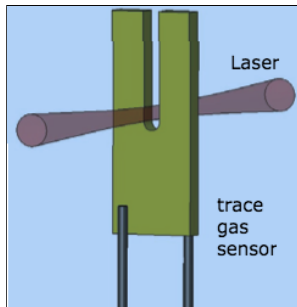
Equations for temperature & pressure in air,
under time-harmonic vibrations

$$\Delta P + \frac{\gamma}{c^2}(\omega^2 - il_v c \omega \Delta)(P - \alpha T) = 0,$$
$$l_h c \Delta T + i\omega \left(T - \frac{\gamma-1}{\gamma\alpha} P \right) = -S.$$

Equation for temperature in tuning fork:
 $D\Delta T + i\omega T = 0.$

Structural deformation: to be implemented ...

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Challenges:

Choosing a proper solver (and possibly preconditioner)

Parallelization of code.

Internal boundary refinements.