

ABSTRACT

The microfluidic systems are used and exploited in different fields, as they are very specific and developed in their use. The micro devices are used in various medical disciplines analysis, chemical and other fields.

Our research team "ISC" laboratory ENERGARID unleashed several lines of research in this area, the micro-mixing, separation of micros particles, producing micros drops, ... For this, we need tools and micros devices for these phenomena.

In this work, we have tried to simulate microdevice in 2D and 3D. Diode convergent/divergent function in gas a very important element in a micropump, we characterized the effect of the pressure and the inclination angle α of the flow in order to achieve a more efficient diode, so we will try to make some changes on these geometrical parameters to improve their performance.

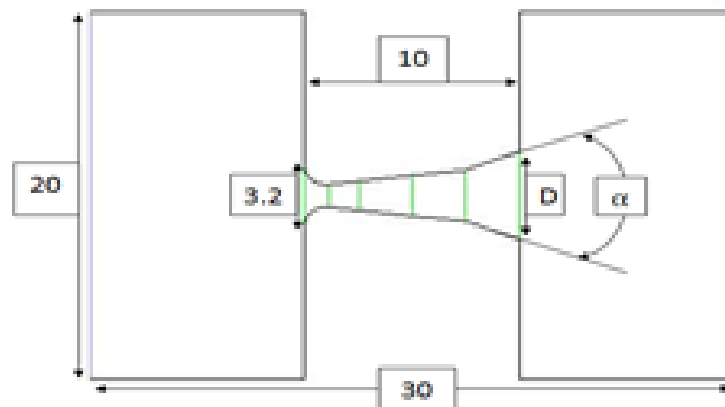


Figure. Geometry of the diode studied convergent / divergent
(dimensions in mm)

In a preliminary study we searched convergence and stability of calculation, this step has led us to make many test calculation parameters.

In the first step increases the diameter D (that is to say increases the angle α), without changing the pressure variation (in this case $\Delta P = 1\text{bar}$), for the purpose of having the angle which gives the maximum flow rate for the two directions.

In the Next Step, we kept the same angle ($\alpha = 19.23^\circ$ direction div and $\alpha = 23.13^\circ$ direction cov) and change at every step the pressure variation (ΔP).

The simulation of the diode convergent / divergent enabled us to conclude that:

- The angle of the diode and the pressure applied directly influence the mass flow output.
- The angle of inclination (α) and the pressure value are two major parameters that influence the efficiency of the diode.
- The 3D simulation of the diode has given us a decrease in the flow rate and a slight improvement of the efficiency of the diode.
- The numerical results show that not only the angle α a very important role on the Functioning of diode convergent / divergent, but the forms of the entries are also essential behaviour can also change depending on the pressure difference imposed. The diodes can change the direction of operation due to a slight modification of their geometry.