# Proposition de TFE 2016-2017

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# Efficient simulation of MEMS arrays

A CMUT ("Capacitive Micromachined Ultrasonic Transducer") is an micro acoustic transducer with two plate-like electrodes biased with a DC voltage and driven with an additional AC signal to harmonically move one of the plates. Using common integrated circuit fabrication processes, a capacitor cell appears as a metallized membrane (top electrode) suspended above a heavily doped silicon substrate (bottom electrode). An insulating layer is included to prevent the two electrodes from shorting. By organizing transducer elements in different geometries, any array shape is possible.

In this master's thesis you will

- learn the fundamentals of CMUTs and coupled electromechanical simulations, using both analytic and numerical techniques

- implement a coupled simulation scheme in the open source finite element software GetDP/Gmsh, based on an existing Matlab prototype

- implement an efficient domain decomposition scheme to simulate arrays of CMUTs
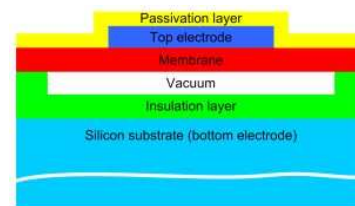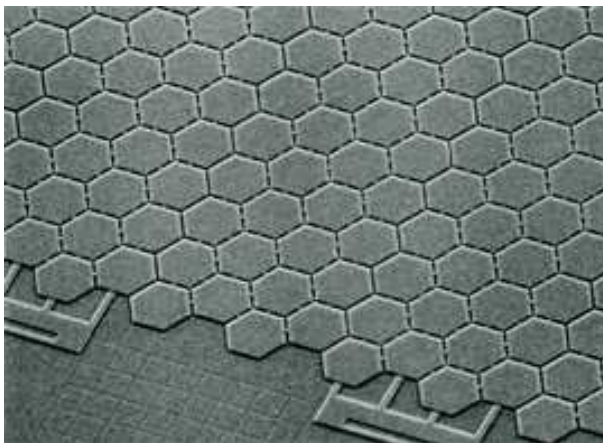


The master thesis will be done in collaboration with the IMEC research center in Leuven (http://www.imec.be). An internship at IMEC is possible.