

MEMS Lab Simulation Tool

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MEMS actuators have multiple design applications. Understanding their behavior as well as the ability to predict their actuation characteristics and voltage response is important when designing these actuators. In order to know these devices will behave, designers have to solve multiple analytical equations and experiments that can be very time consuming. Over the course of the summer a tool was created on nanoHUB that will allow users to enter information about a MEMS actuator and provide the voltage response of the actuator. To create the tool, scaling equations were first provided for various geometry configurations and the equations were next written into a function in MATLAB used for carrying out the calculations and producing curve outputs. The MATLAB code was also integrated using the RAPTURE software to create the tool on nanoHUB. The resulting tool allows users to select the geometry configuration, dimensions of the top electrode and choose from a selected list of electrodes and dielectric materials. Users also have the options of entering properties of their own materials. The final output of this tool is a plot showing the Capacitor-Voltage and the Beam displacement-Voltage sweep over the specified ranges of voltages. The tool created is of interest to MEMS designers and anyone else that wants to learn about MEMS as they can study changes in either the dimensions or materials of a device and observe the response of MEMS actuators in real-time and in a modular fashion.