ANALYTICAL SIMULATION OF THE PULL-IN VOLTAGE TO EVALUATE THE PROCESS INDUCED STRESS AND YOUNG'S MODULUS INTO THE MICROMACHINING POLYSILICON LAYERS BY THE PULL-IN VOLTAGE METHOD

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Abstract. *A new form of the set of two equation applied to the test beam structure fabricated during the micromachining technology suitable to easy extract the material parameters in order to optimize the diffusion process and obtain a linear response of the polysilicon microelements like membranes for the silicon capacitive pressure sensors is presented. On this basis there were deduced simulating analytical solutions to describe the beam deformation and the pull-in voltage as a function of the beam length and other geometrical parameters, allowing to optimize the pull-in voltage structure and to easily extract the values of the stress and the young's modulus by a fitting procedure on the experimental data. A graphical method to evaluate directly the induced stress and a combined graphical method with an iteration procedure to determine both the stress and young's modulus are also presented.*

Keywords: Analytical simulation; polysilicon capacitive pressure sensors for biomedical applications: pull-in voltage method; process-induced stress and Young's modulus.

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