



DEVICE APPLICATION OF NON-EQUILIBRIUM MOS CAPACITORS FABRICATED ON HIGH RESISTIVITY SILICON

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Abstract —This work shows that the direct pulse-wide-modulated (PWM) output electric signal, with a duty cycle controlled by light intensity, can be obtained using a circuit that contains a saw-tooth voltage generator connected in series with a dc voltage source and a metal (semitransparent gate) oxide semiconductor capacitor (MOS-C) operating in non-equilibrium mode.

Amplified output signal presents positive and negative PWM waveforms that can be easily separated using diodes. The duty of the positive part is proportional to the light intensity, whereas for the negative part is inversely proportional to the intensity. The frequency operating range of this proposed instrument varies from 1 Hz to a few kilohertz. The duty cycle of the PWM output signal varies from 2 to 98 % when the incident light intensity is varying in the microwatts range. This new transducer could be useful for automatic control, robotic applications, dimmer systems feedback electronic systems, and non-contact optical position sensing for nulling and centering measurements. The detailed description of the physical and operating principles of this invented transducer are presented.

Index terms; MOS-capacitor; silicon; pulse-width modulation; nulling and centering measurements.