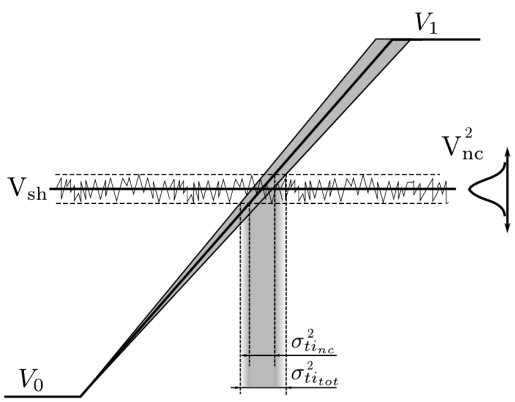
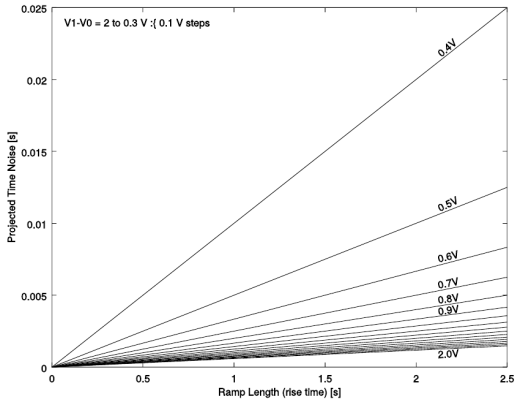
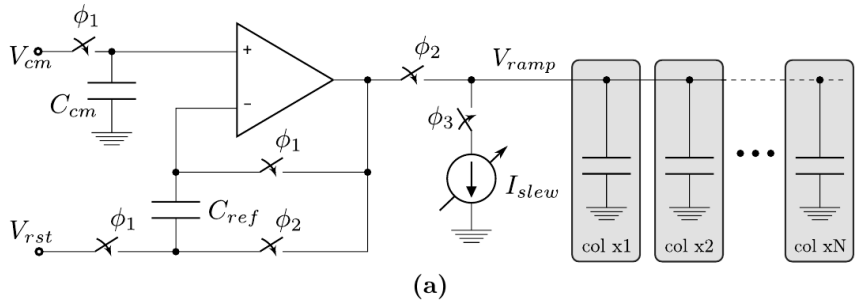
Photolitics OOD,
blvd. Skobelev 4, 7000 Ruse, Bulgaria
Tel: +359896399662
www.photolitics.com

Topic for Diploma Thesis:

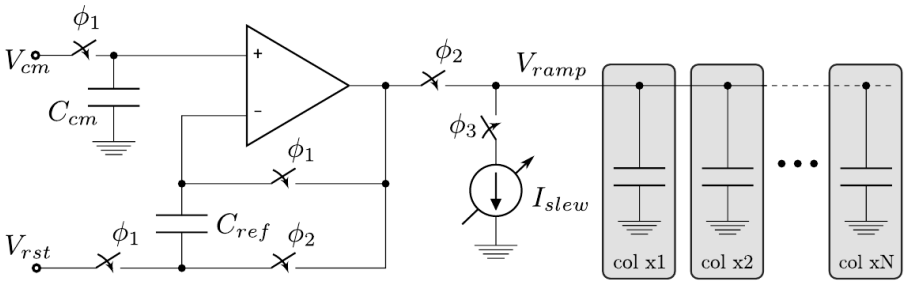
Studies on Low-Noise High-Efficiency Ramp Reference Voltage Generators







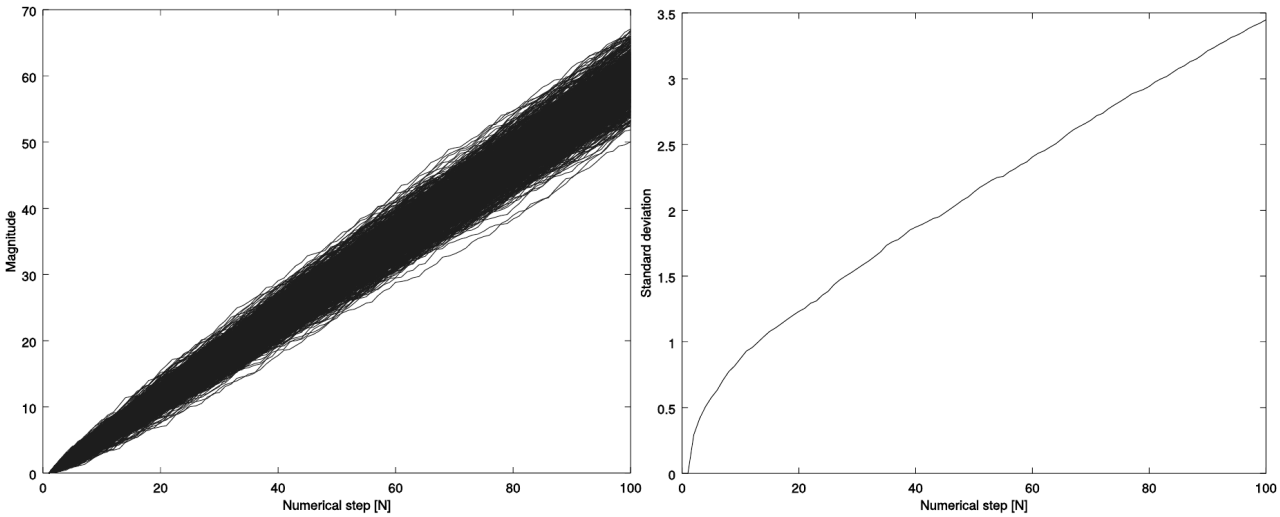
(a)



The Single-Slope, often known as ramp ADC is the most common type of column-parallel ADC used in CMOS image sensors and high-precision instrumentation measurement analog front ends. It offers favorability to CMOS process node scaling and excellent area requirement. However, unlike other types of ADCs, the ramp ADC needs a source of linear voltage generation which is

used by the comparator circuits to create a pulse-width-modulated signal controlling its binary discrimination counters.

A major challenge in column-parallel ramp ADCs is the generation and distribution of highly accurage linear ramp reference voltage to all columns. In addition, major obstacles such as comparator kickback noise need to be well controlled and taken into consideration when designing a reference ramp generator.



The noise present on the ramp reference voltage is itself directly translated to output ADC digital number noise, which degrades image quality and is highly visible under low light illumination in the case of a CMOS image sensor. Depending on the ramp generator type the current noise on the ramp refefence could undergo integration and present itself with high absolute deviations in long integration time scenarios.

Photolitics has a number of ramp reference voltage generator designs used in CMOS image sensors, however, we seek to improve both the noise and ramp linearity. In addition, the development of a varying slope ramp generator would be a necessary exploration feature, to be used in a so called Photon Transfer Curve inspired ramp generator and ADC design.

If you are enthusiastic in working on analog integrated circuit design, using state-of-the-art CMOS fabrication nodes and tools, you are very welcome to join our R&D design team where you would be guided and supported on a daily basis. Possible tasks for the design include theoretical modelling, practical circuit design, simulation, systems design, and layout. If the student is a fast-learner and is able to deliver a design matching with our testchip fabrication schedules, there is a possibility for inclusion of his own design with our test devices. This would lead to a thesis including a real chip fabrication and possibilities for evaluation and measurement. We also encourage outcome publications in highly-ranked scientific journals.

The thesis work can be combined with an internship, whose total duration can be flexible and subject to negotiations.

Additional information on the thesis topic can be obtained by Deyan Levski at deyan.levski@photolitics.com

About Photolitics

Photolitics is a custom image sensor design house, specializing in industrial machine vision CMOS Image Sensor development, miniature medical endoscopic camera modules and mixed-signal ASIC design. We are a group of world-class IC design professionals with multi-decade experience in photonic IC design, CMOS Image Sensors and analog mixed-mode integrated circuits. Through our wide network of connections we distinguish ourselves as a small IC design house, with exciting opportunities for growth and professional development.

To find out more about us, visit our website: http://photolitics.com