

## Abstract

Research Title : The Design and Develop of Current-mode First-order All-pass Filter and  
Its Applications

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This research presents the design and development of a current-mode first-order all-pass filter using CFTA. The features of the proposed oscillator are that: (1) Electronic tunability of phase shift. (2) High-impedance current outputs. (3) Without any component matching requirements. (4) Consisting of merely 1 CFTA and 1 grounded capacitor without external resistors. The application examples as a current-mode quadrature sinusoidal oscillator, a current-mode mutiphase sinusoidal oscillator and a current-mode band reject filter are included to show the usability of the proposed first - order all-pass filter.

The PSpice simulations using the parameters of a 0.25 $\mu$ m TSMC CMOS technology with  $\pm 1.25$ V voltage supply,  $C=100$ pF,  $I_B= 110\mu$ A and  $V_{BB}=-0.5$ V show that the proposed first-order all-pass filter can provide phase shifting between 0-180°. Three application circuits use a few active elements without external resistors that make small chip area. The proposed circuit is then suitable for IC architecture. Moreover, the experimental results using commercial ICs (AD844 and LT1228) agree well with the theoretical anticipation.

Keywords: First-order all-pass filter, CFTA, Quadrature sinusoidal oscillator, Mutiphase sinusoidal oscillator, Current-mode