Accepted Manuscript

Regular paper

Grounded Capacitor Based Fully Cascadable Electronically Tunable Current-Mode Universal Filter

Firat Yucel, Erkan Yuce

PII: S1434-8411(17)31008-7
DOI: http://dx.doi.org/10.1016/j.aeue.2017.05.041
Reference: AEUE 51912

To appear in: *International Journal of Electronics and Communications*

Received Date: 25 April 2017
Accepted Date: 28 May 2017

Please cite this article as: F. Yucel, E. Yuce, Grounded Capacitor Based Fully Cascadable Electronically Tunable Current-Mode Universal Filter, *International Journal of Electronics and Communications* (2017), doi: http://dx.doi.org/10.1016/j.aeue.2017.05.041

Grounded Capacitor Based Fully Cascadable Electronically Tunable Current-Mode Universal Filter

Firat Yucel

Akdeniz University, Department of Informatics,

07059, Konyaalti, Antalya, Turkey

E-mail: fyucel@akdeniz.edu.tr

Erkan Yuce*

Pamukkale University, Department of Electrical and Electronics Engineering,

20160, Kinikli, Denizli, Turkey

E-mail: erkanyuce@yahoo.com

* Corresponding author

Abstract: A novel current-mode (CM) universal filter configuration composed of five plus-type second-generation current conveyors (CCII+s) as active components besides three resistors and three grounded capacitors as passive elements is proposed in this paper. The proposed filter can simultaneously provide high-pass, band-pass and low-pass responses. Also, it can realize all-pass and notch responses with interconnection of convenient output currents. It can be cascaded with other CM ones easily because it has low input and high output impedances. It offers orthogonal control of angular resonance frequency and quality factor. An electronically tunable universal filter can be easily obtained if plus-type current controlled current conveyors are replaced instead of each of the five CCII+s and all the three resistors are removed. Nevertheless, it needs a single passive element matching constraint for notch and all-pass filter responses. Some simulation and experimental test results are included to confirm the theory.

Keywords: Universal filter; current-mode; CCII+; CCCII+; tunability; orthogonality.

1. Introduction

Analog filters are employed to reduce unwanted signals for instance electrical noise from electrical signals [1]. Analog filter circuits can be realized in different types in integrated circuits (ICs) for example voltage-mode (VM), current-mode (CM), transadmittance-mode and transimpedance-mode filters. CM filters have several superiorities over VM filters, use of