Regular paper

Cascadable Current mode instrumentation amplifier

Deepak Agrawal, Sudhanshu Maheshwari

PII: S1434-8411(17)33005-4
DOI: https://doi.org/10.1016/j.aeue.2018.06.038
Reference: AEUE 52396

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

Received Date: 22 December 2017
Accepted Date: 24 June 2018

Please cite this article as: D. Agrawal, S. Maheshwari, Cascadable Current mode instrumentation amplifier, *International Journal of Electronics and Communications* (2018), doi: https://doi.org/10.1016/j.aeue.2018.06.038

Cascadable Current mode instrumentation amplifier

Deepak Agrawal, Sudhanshu Maheshwari

Department of Electronics Engineering,
Z.H.C.E.T., Aligarh Muslim University, Aligarh 202 002, India
deepaka.38@gmail.com, sudhanshu_maheshwari@rediffmail.com

Abstract: In this paper, a Current Mode Instrumentation Amplifier (CMIA) is presented. The proposed circuit employs two Extra X Current Controlled Current Conveyors (EX-CCCII) and a single grounded resistor. The circuit offers a wide differential-gain bandwidth, wide CMRR bandwidth, and electronically tunable differential gain. The circuit offers cascadibility feature with input impedance of 2.167 kΩ which is very small in comparison to the output impedance of 2.17 MΩ. Simultaneously, a Transresistance (TR) instrumentation amplifier is also obtained with the features of electronically tunable high differential gain and wide bandwidth. The effect of non-idealities of EX-CCCII on the circuit performance is also analysed. The validity of the proposed circuit is verified through PSPICE simulations using 0.25μm parameters with a supply voltage of ±1.25V. Also, the circuit is verified by experimental results.

Keywords: *current-mode circuit; instrumentation amplifier; EX-CCCII; CMRR; current conveyor; Analog integrated circuit.*

1. Introduction

The usefulness of current conveyors and its variants has now been well established in technical literature [1-5]. The volume of work reported on the subject and the continuous research for better future avenues has ensured the applications of current-mode approach for analog signal processing and more generally for instrumentation and communication systems. The instrumentation amplifier (IA) amplify the differential input signal and reject the common mode signal; which make it widely useful in many application areas such as medical instrumentation, the read out circuit of biosensors, and signal processing [6-8]. IA can be categorized as voltage-mode (VM), current-mode (CM), trans-admittance mode (TAM), and trans-impedance mode (TIM). In the technical literature, the available IA have been realized using active elements such as operational amplifier (Op-Amp) [9, 10], current conveyors (CC) [2-4, 11, 12, 17-19, 21, 23, 24], operational floating current conveyor (OFCC) [7, 8, 25], operational conveyor (OC) [13, 14], current operational amplifier (COA) [20, 22] and and MOS structures [15, 16]. The conventional voltage mode IA circuits based on op-amp have some drawback such as constant gain bandwidth product of op-amp and resistive