Low Sensitivity Third Order Lowpass Butterworth Filter Using CFA

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A third–order lowpass (LP) Butterworth filter design scheme using two CFA devices is presented. The analysis is carried out utilising the parasitic and transadmittance poles of the AD–844 type CFA elements. The circuit is practically active–insensitive with respect to the port mismatch errors ($\in$) of the devices. The filter characteristic had been satisfactorily verified with both PSPICE macromodel simulation and hardware circuit implementation for a frequency range $6\,\text{MHz} \leq f_o \leq 30\,\text{MHz}$.

Keywords: Butterworth filter, lowpass filter, third-order filter, CFA

1 INTRODUCTION

The current feedback amplifier (CFA) device is now well–introduced in the literature as an active building block [1,2] that has some advantageous features over the conventional voltage operational amplifier (VOA) [3]. The significant feature of the CFA is its extended bandwidth (BW) capability that is practically independent of the closed loop gain [4]. This makes the CFA a superior choice over the VOA for the analog signal processing and filter design at relatively high frequencies.

In the recent past, various CFA-based designs for first order and second order selective circuits were proposed [5–11]; some of these schemes assumed the parasitic/transadmittance capacitors to be very low and hence were neglected leading to relatively low frequency designs covering upto a few hundred of KHz. However a third–order Butterworth filter design using the CFA had not yet been reported, albeit other designs using VOA [12] and CC II are available [13].

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