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MOSFET-Only Filter Design Automation Based on Polynomial Regression with Exemplary Circuits

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Abstract: In this work, a novel design automation method is presented for easy construction of MOSFET-Only or MOSFET-C filters. In contrast to previous works in the literature, the proposed algorithm is simple since it uses polynomial fitting models obtained from SPICE data in order to reformulate small signal parameters and some DC characteristics of MOSFET's. Polynomial regressive models facilitate to interact between design constraints (power, area, speed, pole frequency etc.) and design variables (operating voltages, currents and device dimensions). In this regard, two novel agile MOSFET-Only filters produced with the proposed automation process are presented in order to qualify the automation flow. The produced filters are simulated in LT-SPICE and CADENCE-SPECTRE environment by using 0.18µm TSMC technology. These agile filters can easily be operated for a wide range of encrypted communications or very high frequency applications. In addition, it is shown that there is a good agreement between proposed design automation flow and simulations.

***Keywords*--** MOSFET-Only, MOSFET-C, polynomial regression, convex optimization, posynomial, monomial, current mode, analog filter design

1-Introduction

Research on the analog design automation emerges on troublesome manual design cycles in the analog circuit design. Manual circuit-sizing in analog design is a time consuming process since non-idealities in a practical circuit results serious deviations from theoretical