Current Controlled Tunable Bandwidth Low Pass Filter using 3-MOS Model

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***Abstract*—In this article, I have presented a current controlled tunable bandwidth 1st order Low Pass filter in 28nm technology**

Keywords—MOS, Low Pass Filter, Bandwidth

I. INTRODUCTION

A low-pass filter is a filter that passes signals with a frequency lower than a selected cut-off frequency and attenuates signals with frequencies higher than the cut-off frequency.I have presented a model which will make the bandwidth of the filters tuneable by controlling dc current.

II. REFERENCE CIRCUIT DESIGN

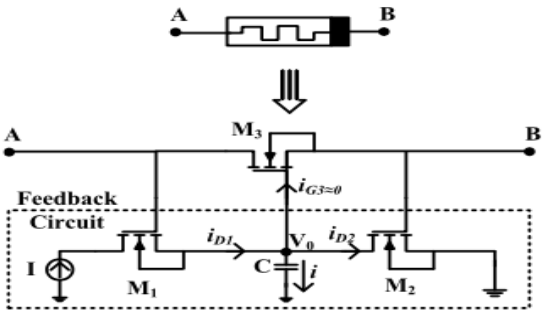

Figure 1 : Current (I) controlled 3-MOS memristor emulator to replace resistor in LPF having terminals A & B

In Figure 1, the current source (I) is going to regulate the memristance which in turn is going to control the Bandwidth or the Upper Cutoff Frequency of the HPF i.e this design gives bandwidth tunability. We have maintained,

$(W/L)1 = (W/L)2 = 0.156\mu / 0.156\mu$ and

$(W/L)3 = 7.78\mu / 0.156\mu$

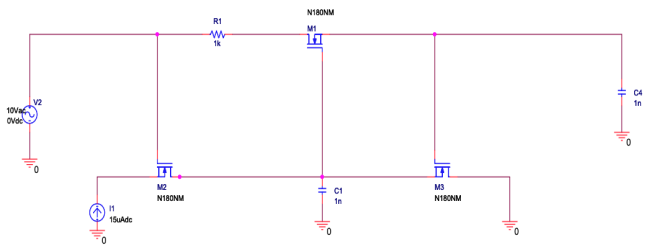

Figure 2: 1st Order tunable bandwidth Low Pass Filter using 3-MOS floating memristor model

III. REFERENCE WAVEFORM

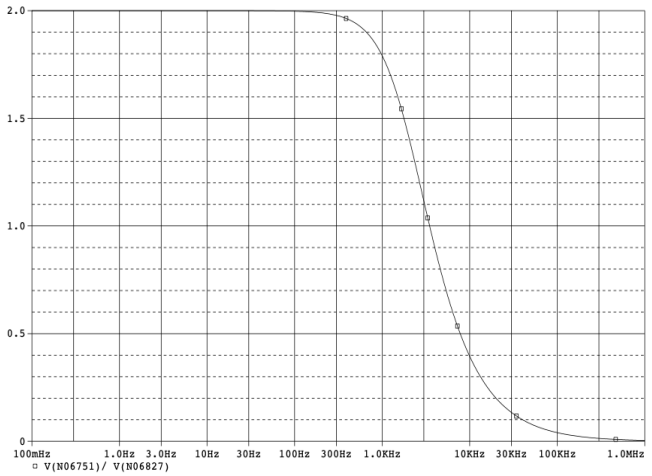

Figure 3: Gain vs Frequency plot

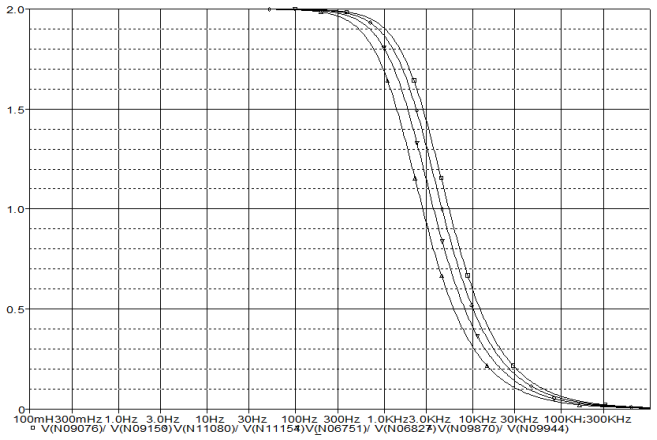

Figure 4: Tunable bandwidth obtained by varying current source (I) in 3-MOS floating memristor model

REFERENCE

[1] J. Vista, A. Ranjan, "A simple floating MOS-memristor for high-frequency applications", IEEE Trans. Very Large Scale Integr. Syst. **27**(5), 1186–1195 (2019)