CMOS Current-Mode Hyperbolic Tangent Sigmoid Function Implementation Using Multi-Segment Approximations

鄭智仁,林國珍,陳竹一
Electronics Engineering
Engineering
kuojenlin@chu.edu.tw

Abstract

We propose a multi-segment approximation method to design a CMOS current-mode hyperbolic tangent sigmoid function with high accuracy and wide input dynamic range. The dynamic range is dependent on the number of segments and the accuracy is related to the dividing point. From mathematical results, we can observe the proposed method outperforms traditional methods. We implement the multi-segment approximation circuit to realize the hyperbolic tangent sigmoid function. The simulation results of the proposed circuit show a wide input dynamic range from -256 u A to 240 u A for relative error less than 3% and a high bandwidth of 138 MHz.

Keyword：Current-mode circuit, Taylor series approximation, hyperbolic tangent sigmoid function, analog circuit design