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高阶 Σ - Δ 调制器的滑模电路设计方法

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Sliding Mode Circuit Design of High-Order Σ - Δ Modulators

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- 摘要
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摘要 提出了一种新的高阶 Σ - Δ 调制器滑模电路设计方法.首先,证明了滑模控制系统的 Σ - Δ 调制编码功能,进而推出了 Σ - Δ 调制器传输函数形式的稳定性判据;然后,结合判据提出了一种稳定的巴特沃斯极点、零点优化的传输函数设计算法;最后,利用建立参数方程及求解、参数仿真调整,设计了 Σ - Δ 调制器的环路滤波器级联结构的电路,并通过一个设计实例及仿真,验证了所提方法的可行性.

关键词: 滑模控制; Σ - Δ 调制器; 环路滤波器

Abstract: A novel sliding mode circuit approach for implementing high-order Σ - Δ modulators is proposed in this paper. Firstly, the Σ - Δ modulating coding function is proved, and then the stability criterion of transfer function for high-order Σ - Δ modulators is deduced. Secondly, the stability design algorithm of transfer function using the deduced criterion, Butterworth poles and zeros optimization is introduced. Finally, the circuit implementation of Σ - Δ modulators with cascading loop-filters is completed by using the solution of parameter equations and simulation modifications. A design example and simulation results verify that the proposed method is feasible.

Key words: sliding control; Σ - Δ modulator; loop filter

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