

Class D Audio Amplifier With Sliding Mode Control

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Abstract

Class D audio amplifiers are replacing the traditional class AB audio amplifiers for low voltage-low power applications due to their high efficiency property, ideally 100%, but to get a good linearity for high fidelity systems is still a challenge. In this work we take advantage of the non-linear control theory along with the classical feedback theory to design a class D audio amplifier with efficiency above 90% and THD below -70dB.

Description

Due to the tendency to miniaturization along with the requirement of low power consumption in audio systems for home electronics the class D audio amplifier has become the new option due to its high efficiency to replace the old class AB audio amplifiers.

Even though this property is a great advantage, the linearity, due to the pulse width modulation scheme, is poor in comparison with the class AB amplifiers. Demanding of systems with high fidelity requires the implementation of higher order output filters to remove the harmonics introduced by the digital output of the system, making the amplifier complex and not practical for on-chip integration.

In this work, we apply the sliding mode control theory to generate the PWM signal along with a double local feedback loop to improve the linearity of the system up to -70dB using just a second order output filter making the system robust to external perturbations and feasible for IC integration.

Figure 1 presents experimental results of the system implemented using discrete components. This circuit was built in order to see the system behavior and its characteristics before the IC implementation.

Status Of The Project

Chip is under testing.

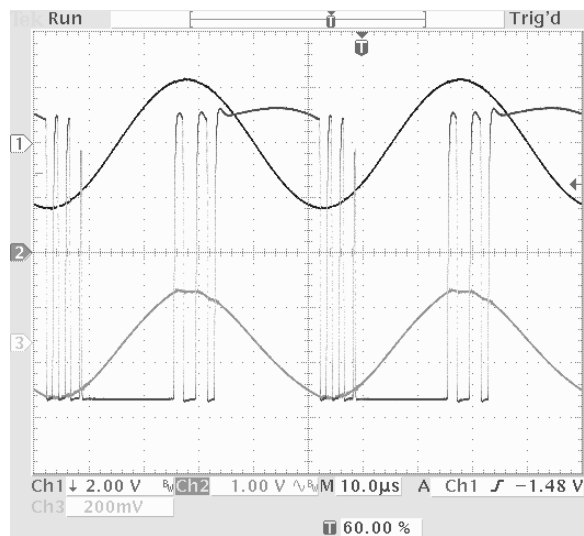


Figure 1

References

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