

Self-tuned Class-D Audio Amplifier with HRMRAC Control

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ABSTRACT

Despite of not being novelty on other areas, specifically speaking of audio and sound reinforcement systems, today, automation still represents a challenge. Crossovers, RTAs and equalizers, allied to the power amplifiers, are examples of it. Usually, such equipment is connected to the power amplifier and is tuned without strictly considering, for example, the electromechanical dynamics. The alternative of a sound engineer is, then, to compensate frequency response of entire electronic and amplification circuitry through use of filtering devices. What is physically impossible due to the causality principle.

As a consequence, present work describes an automatic Class-D audio amplifier with integrated crossover, connected to a single ended loud-speaker structure, obtained from a robust self-tuned model reference adaptive controller (HRMRAC). The controller uses an input-output method robust to the additive and multiplicative unmodeled speakers dynamics. The crossover filter is defined by the reference model which is tuned based on Kalman filtering theory. In order to verify the efficiency of the proposal, a full- bridge 2-phase output stage configuration was implemented to drive the system. Results are presented.

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