Optimal control of a high-frequency class-D amplifier

Control loops have been used with switch-mode audio amplifiers to improve the sound quality of the amplifier. Because these amplifiers use a high-frequency modulation, precautions in the controller design must be taken. Further, the quality factor of the output filter can have a great impact on the controller’s capabilities to suppress noise and track the audio signal. In this paper design methods for modern control are presented. The control method proves to easily overcome the challenge of designing a good performing controller when the output filter has a high quality factor. The results show that the controller is able to produce a clear improvement in the Total Harmonic Distortion with up to a 30 times improvement compared to open-loop with a clear reduction in the noise. This places the audio quality on pair with current solutions.

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