Constant Switching Frequency Self-Oscillating Controlled Class-D Amplifiers

The self-oscillating control approach has been used extensively in class-D amplifiers. It has several advantages such as high bandwidth and high audio performance. However, one of the primary disadvantages in a self-oscillating controlled system is that the switching frequency of the amplifier varies with the ratio of the output voltage to the input rail voltage. In other words, the switching frequency varies with the duty cycle of the output. The drop in the frequency results in lower control bandwidth and higher output voltage ripple, which are undesirable. This paper proposes a new self-oscillating control scheme that maintains a constant switching frequency over the full range of output voltage. The frequency difference is processed by a compensator whose output adjusts the total loop gain of the control system. It has been proven by simulation that a constant switching frequency self-oscillating converter is achieved and the proposed control circuit performs satisfactorily.