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Analog Voltage Inverter Drive for Capacitive Load with Adaptive Gain Control

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Abstract : Piezoelectric actuator is treated as RC load when it is modeled electrically. For some piezoelectric actuator applications, arbitrary voltage is required to actuate. Especially for unidirectional arbitrary voltage driving like as sine wave, some special inverter with circuit that can charge and discharge the capacitive energy can be used. In this case, the difference between power supply level and the object voltage level for RC load is varied. Because the control gain is constant, the controlled output is not uniform according to the voltage difference. In this paper, for charge and discharge circuit for unidirectional arbitrary voltage driving for piezoelectric actuator, the controller gain is controlled according to the voltage difference. With the proposed simple idea, the load voltage can have controlled smoothly although the voltage difference is varied. The appropriateness is proved from the simulation of the proposed circuit.

Keywords : analog voltage inverter, capacitive load, gain control, dc-dc converter, piezoelectric, voltage waveform
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