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High-power Piezoelectric Tuner Driver for Lorentz Force Compensation

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Superconducting Radio Frequency (SRF) cavities are used in modern accelerators to efficiently accelerate particles. When cavity is supplied with pulsed RF field it undergoes a mechanical strain due to the Lorentz force. The resulting deformation causes dynamic detuning whose amplitude depends on mechanical properties of the cavity, RF pulse rate and their profile. This effect causes considerable loss of acceleration performance. Therefore, it is usually actively compensated, most commonly with fast piezoelectric actuators.

MicroTCA.4 standard was developed to accommodate control and data acquisition electronic systems of large-scale physics applications. The paper presents a design of high-power amplifier implemented using the MicroTCA.4 technology. The design of the driver was optimized for driving large-capacitance piezo actuators. Several possible architectures of the driver are presented and compared, taking into consideration the power and cooling limitations of MicroTCA.4. The design of a two-channel piezo driver and its initial laboratory test results are also discussed.

Minioral

Yes

Description

microTCA 4.

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