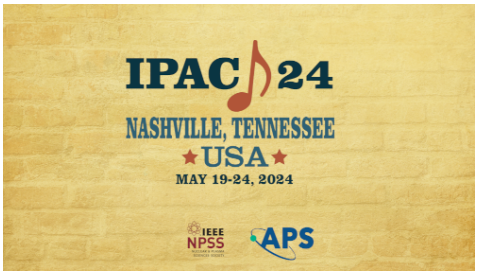


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# Development of linear power operational amplifier for TPS correction magnet power supply

*Thursday, 23 May 2024 16:00 (2 hours)*

This paper investigates the design and implementation of a TPS correction magnet power supply using a combination of a linear power operational amplifier (PA05) and a pre-regulator voltage controller. The PA05 linear power operational amplifier features bipolar output, high internal power dissipation, and wide bandwidth. Utilizing a DCCT sensor as a current feedback element integrated with the pre-regulator voltage controller, a closed-loop current modulation circuit is formed, providing the variable voltage required by the linear power operational amplifier. We have successfully developed a prototype of a linear power operational amplifier power supply with a pre-regulator voltage controller for TPS correction magnets through these measures. Design validation is achieved through control loops, resulting in fast and stable output current performance. The output current ripple is maintained below 100 μA, and the rise time during the step response is 75 μs. During the frequency response test using a 0.1 V interference signal, the gain margin remained within -3 dB at an 11.2 kHz bandwidth, and the phase margin was within -45 ° over a range of 5.1 kHz. The long-term stability of the output current is maintained at ten ppm. Finally, a hardware prototype circuit is assembled in the power laboratory with input voltage ranging from ±24 V, an output current of ±20 A, and a maximum rated power of 240 W.

## Footnotes

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