عنوان مقاله:

Application of Grey Wolf Optimization Algorithm with Aggregation Function on Designing Interleaved Boost Converter

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خلاصه مقاله:

kground and Objectives: The interleaved approach has a long history of use in power electronics, particularly for high-power systems. The voltage and current stress in these applications exceed the tolerance limit of a power element. The present paper introduces an improved version of an interleaved boost converter, which uses voltage mode control. The objectives of this research are improvement in the interleaved boost converter's performance in terms of the temporal parameters associated with settling duration, rising time, and overshoot. Methods: An improved PI controller (proportional integral controller) is used for adjusting the proposed converter's output voltage. In the present work, the Grey Wolf Optimization algorithm with aggregation function definition (GWO_AF) is utilized to adjust the free coefficients of the PI controller. In reality, the closed-loop dynamic performance and stability can be improved by designing and implementing an optimized PI controller. Results: The improvement of the freedom degree in the interleaved boost converter resulted from the existence of a few power switches in a parallel channel in the proposed circuit. An additional advantage of the interleaved boost converter, compared to the conventional one, is that it produces a lower output voltage ripple. Conclusion: The usage of multi-objective optimization algorithms in designing a PI controller can significantly improve the performance parameters of an interleaved boost converter. Also, our findings indicated the excellent stability of the proposed converter when connected to the network.

کلمات کلیدی:

Interleaved Boost Converter, Non-Minimum Phase System, Optimized Proportional Integral Controller, Grey Wolf Optimization algorithm with aggregation function definition (GWO_AF), Switch-Mode Power Supply

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