Performance Comparison of Single-Phase Cycloconverters with SiC Transistor and IGBT with different control strategies

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***Abstract*—Silicon carbide (SiC) MOSFET devices exhibiting several advantages, including high blocking voltage, lower conduction losses, and lower switching losses, when compared to silicon-based devices have become commercially available, enabling their adoption into power supply products. This paper presents a novel approach to designing a cycloconverter using SiC MOSFETs as opposed to the conventional usage of IGBT. A comparative study is attempted between the two with respect to power loss, system efficiency, leakage current etc. Furthermore, different closed loop control strategies are used to control the speed of an induction motor using the SiC cycloconverter model designed in this paper. MATLAB/Simulink models and simulations were used to analyse the results for the above.**

***Keywords—*Cycloconverters, IGBT, Silicon carbide MOSFET, PID controller, LQR controller.**

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Identify applicable funding agency here. If none, delete this text box.

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*a**b* 

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## Some Common Mistakes

* The word “data” is plural, not singular.
* The subscript for the permeability of vacuum *μ*0, and other common scientific constants, is zero with subscript formatting, not a lowercase letter “o”.
* In American English, commas, semicolons, periods, question and exclamation marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)
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1. Table Type Styles

|  |  |  |  |
| --- | --- | --- | --- |
| **Table Head** | **Table Column Head** | | |
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| copy | More table copya |  |  |

1. Sample of a Table footnote. (*Table footnote*)
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##### References

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Number footnotes separately in superscripts. Place the actual footnote at the bottom of the column in which it was cited. Do not put footnotes in the abstract or reference list. Use letters for table footnotes.

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1. G. Eason, B. Noble, and I. N. Sneddon, “On certain integrals of Lipschitz-Hankel type involving products of Bessel functions,” Phil. Trans. Roy. Soc. London, vol. A247, pp. 529–551, April 1955. *(references)*
2. J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68–73.
3. I. S. Jacobs and C. P. Bean, “Fine particles, thin films and exchange anisotropy,” in Magnetism, vol. III, G. T. Rado and H. Suhl, Eds. New York: Academic, 1963, pp. 271–350.
4. K. Elissa, “Title of paper if known,” unpublished.
5. R. Nicole, “Title of paper with only first word capitalized,” J. Name Stand. Abbrev., in press.
6. Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, “Electron spectroscopy studies on magneto-optical media and plastic substrate interface,” IEEE Transl. J. Magn. Japan, vol. 2, pp. 740–741, August 1987 [Digests 9th Annual Conf. Magnetics Japan, p. 301, 1982].
7. M. Young, The Technical Writer’s Handbook. Mill Valley, CA: University Science, 1989.

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