

Influence of Inverter Excitation on Iron Loss of Non-Oriented Electrical Steel

UESAKA Masahiro*1, OMURA Taisei*2, SENDA Kazuhiko*3

Abstract:

The influence of inverter excitation on the iron loss of non-oriented electrical steel (NO-EE) is investigated. The iron loss is measured under various excitation conditions, including ON (On-line) and P-M (Pulse Modulation) excitation. The results show that the iron loss is significantly affected by the excitation method, and the P-M excitation method is found to be more effective in reducing the iron loss compared to the ON excitation method. The iron loss is also affected by the frequency of the excitation, and the loss increases with increasing frequency. The results indicate that the P-M excitation method is a promising technique for reducing the iron loss of NO-EE in inverter applications.

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1. Introduction

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changed⁷⁾. Yet, the observed increase in the average value of the PWM inverter efficiency is due to the ON-state voltage drop change and the reduced value of the average voltage drop. The ON-state voltage drop is affected by decreasing the ON-state current. Based on the above, it can be concluded that a decrease in the average value of the ON-state current and the average value of the ON-state voltage drop can be achieved by decreasing the average value of the ON-state current and the average value of the ON-state voltage drop. The efficiency of the PWM inverter is calculated as follows. The efficiency is

2.2 Experimental Results and Discussion

Figure 3 shows the influence of the carrier frequency f_c on the iron loss P_{inv} and the total iron loss P_{inc} for a sinusoidal modulation index $m = 0.4$. The magnetic flux density B_m is 1.5 T and the fundamental frequency f is 50 Hz. The sheet thickness t is 0.5 mm. The iron loss P_{inv} and the total iron loss P_{inc} are plotted against the carrier frequency f_c (Hz). The iron loss P_{inv} increases with f_c , while the total iron loss P_{inc} remains relatively constant. The iron loss P_{inv} is approximately 1.5 W/kg at $f_c = 5000$ Hz and increases to about 5.5 W/kg at $f_c = 20000$ Hz. The total iron loss P_{inc} is approximately 1.5 W/kg at $f_c = 5000$ Hz and increases to about 2.5 W/kg at $f_c = 20000$ Hz.

Figure 4 shows the influence of the carrier frequency f_c on the iron loss P_{inv} and the total iron loss P_{inc} for a sinusoidal modulation index $m = 0.4$. The magnetic flux density B_m is 1.5 T, the fundamental frequency f is 50 Hz, and the sheet thickness t is 0.5 mm. The iron loss P_{inv} and the total iron loss P_{inc} are plotted against the carrier frequency f_c (Hz). The iron loss P_{inv} increases with f_c , while the total iron loss P_{inc} remains relatively constant. The iron loss P_{inv} is approximately 1.5 W/kg at $f_c = 5000$ Hz and increases to about 5.5 W/kg at $f_c = 20000$ Hz. The total iron loss P_{inc} is approximately 1.5 W/kg at $f_c = 5000$ Hz and increases to about 2.5 W/kg at $f_c = 20000$ Hz.

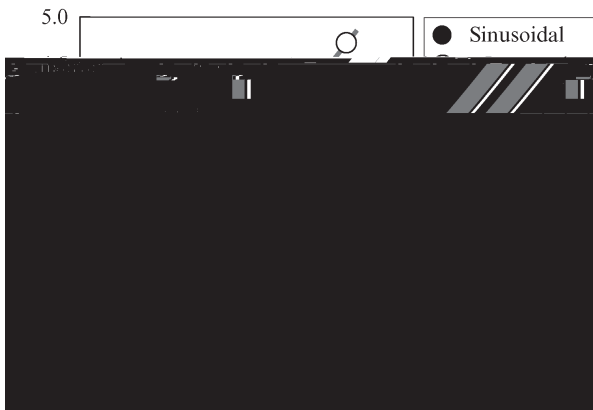


Fig. 4 Influence of carrier frequency on P_{inv}

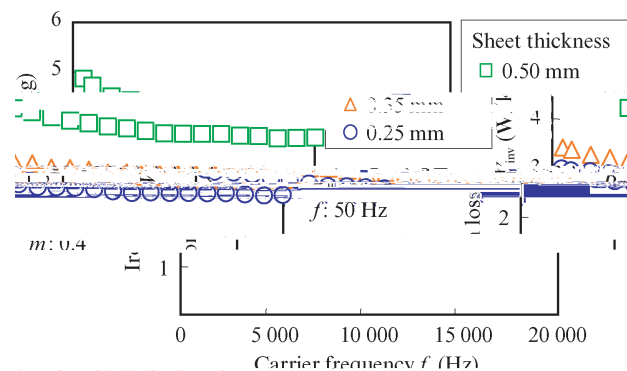


Figure 6 shows the influence of the modulation index m on the iron loss P_{inv} and the total iron loss P_{inc} for a sinusoidal carrier frequency $f_c = 50$ Hz. The magnetic flux density B_m is 1.5 T, the fundamental frequency f is 50 Hz, and the sheet thickness t is 0.5 mm. The iron loss P_{inv} and the total iron loss P_{inc} are plotted against the modulation index m . The iron loss P_{inv} increases with m , while the total iron loss P_{inc} remains relatively constant. The iron loss P_{inv} is approximately 1.5 W/kg at $m = 0.25$ and increases to about 12.5 W/kg at $m = 0.5$. The total iron loss P_{inc} is approximately 1.5 W/kg at $m = 0.25$ and increases to about 2.5 W/kg at $m = 0.5$.

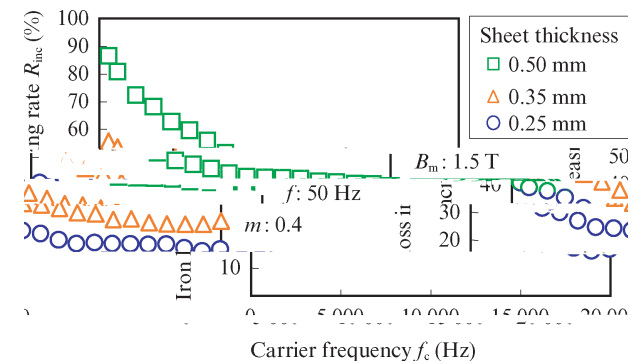


Fig. 5 Influence of carrier frequency on P_{inc}

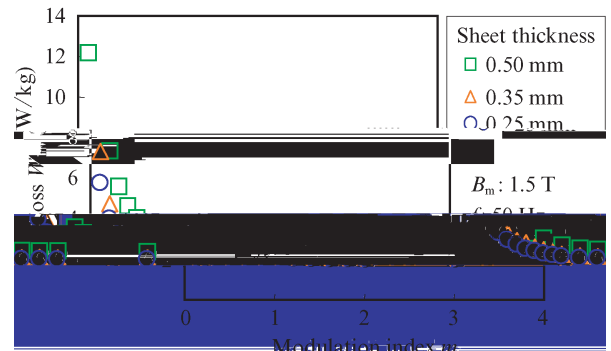


Fig. 6 Influence of modulation index on P_{inv}

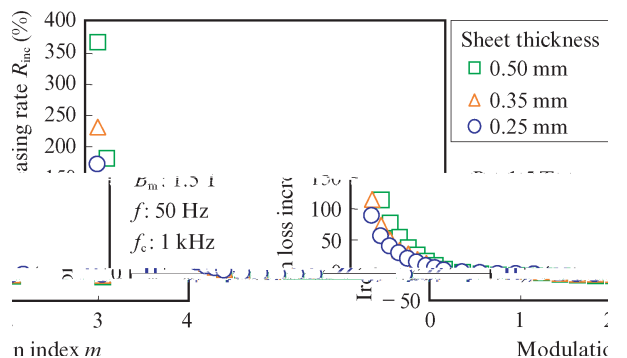


Fig. 7 Influence of modulation index on P_{inc}

Figure 16 shows the variation of iron loss with frequency and flux density for different excitation conditions. The results show that the iron loss increases with both frequency and flux density. The iron loss is significantly higher at 1.95 T and 20.05 Hz compared to 0.1 T and 1.9 Hz.

Figure 16 illustrates the relationship between iron loss and excitation conditions. The iron loss is measured in W/kg and is plotted against frequency (Hz) and flux density (T). The results show that iron loss increases with both frequency and flux density. The iron loss is significantly higher at 1.95 T and 20.05 Hz compared to 0.1 T and 1.9 Hz.

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Figure 15 shows the variation of iron loss with frequency and flux density for different excitation conditions. The results show that the iron loss increases with both frequency and flux density. The iron loss is significantly higher at 1.95 T and 20.05 Hz compared to 0.1 T and 1.9 Hz.

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3. Effect of ON Voltage on Iron Loss under Inverter Excitation

3.1 Experimental Procedure

The experimental procedure involves the use of a 5A 100V DC power supply and a 50Hz AC power supply. The iron loss is measured using a power analyzer. The results show that the iron loss increases with both frequency and flux density. The iron loss is significantly higher at 1.95 T and 20.05 Hz compared to 0.1 T and 1.9 Hz.

The detection of arrhythmias in the ECG signal is a challenging task. In this paper, we propose a novel method for the detection of arrhythmias in the ECG signal. The proposed method is based on the combination of the wavelet transform and the fuzzy logic. The wavelet transform is used to decompose the ECG signal into different frequency components. The fuzzy logic is used to analyze the decomposed signal and to detect the arrhythmias. The proposed method is evaluated using a large number of ECG signals. The results show that the proposed method is able to detect the arrhythmias with a high accuracy. The proposed method is also able to detect the arrhythmias in the presence of noise. The proposed method is a promising method for the detection of arrhythmias in the ECG signal.

4. Conclusion

In this paper, we have presented a novel method for the detection of arrhythmias in the ECG signal. The proposed method is based on the combination of the wavelet transform and the fuzzy logic. The proposed method is evaluated using a large number of ECG signals. The results show that the proposed method is able to detect the arrhythmias with a high accuracy. The proposed method is also able to detect the arrhythmias in the presence of noise. The proposed method is a promising method for the detection of arrhythmias in the ECG signal.

- (1) The proposed method is able to detect the arrhythmias with a high accuracy.
- (2) The proposed method is also able to detect the arrhythmias in the presence of noise.
- (3) The proposed method is a promising method for the detection of arrhythmias in the ECG signal.
- (4) The proposed method is able to detect the arrhythmias in the presence of noise.

beca e e e n c e a e n t e e d e l a n t e a n c a e d b i e O N t a g e a n t e a e n t a c c a n t e e e d e d a e b a n e d t e e e n c e a n e n t e a g n e c d e n t a e .

References

- 1) Taha, R.; Wang, S.; Alqahtani, T.; Mousa, K.; Nurgali, K.; Sen, M. B. *Journal of Intelligent and Fuzzy Systems*. 2013, *26*, 1148-1156. (in Japanese)
- 2) Oghata, Y. *International Journal of Intelligent Systems and Applications*. 1992, *6*, 513-520. (in Japanese)
- 3) K. I. A.; S. H.; A.; S.; I.; K.; T. *IEEE Transactions on Systems, Man, and Cybernetics*. 1990, *20*, 1969-1971.