Proceedings of the 20th IEEE International Conference on Modern Electrical and Energy Systems, MEES 2021 •
2021 • 20th IEEE International Conference on Modern Electrical and Energy Systems, MEES 2021 • Kremenchuk • 21 September 2021 • Код 174290

Тип документа
Публикация конференции

Тип источника
Материалы конференции

ISBN
978-166542366-3

DOI
10.1109/MEES52427.2021.9598686

Смотреть больше

The Traction Induction Motor Magnetic Circuit Saturation Influence on the Variable Electric Drive Energy Efficiency

Iegorov, Oleksiy[a] ; Iegorova, Olga[b] ; Potryvaieva, Natalia[c] ; Zaluzhna, Halyna[d]

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[a] O. M. Beketov National University of Urban Economy in Kharkiv, Kharkiv, Ukraine
[b] Kharkiv Petro Vasylenko National Technical University of Agriculture, Kharkiv, Ukraine
[c] Mykolayiv National Agrarian University, Mykolayiv, Ukraine
[d] Ukrainian Engineering and Pedagogical Academy, Kharkiv, Ukraine

Краткое описание

Currently, variable frequency induction motors (IM) are widely used as traction machines. This is primarily due to the semiconductor devices improvement, with the help of which the traction IM are powered and the its operation modes are regulated. During the frequency-controlled IM operation, the problem arises at determining their optimal control parameters when the load on the IM shaft changes. As a rule, traction IMs are characterized by a change in the load over a wide range and, therefore, to increase their energy efficiency, it is necessary to use the optimal regulation for the supply voltage and the current magnetization reversal frequency in the IM windings. With wide supply voltage regulation, the magnetic flux saturation in the IM stator core changes in proportion to it. With an increase in the magnetic flux saturation, the stator winding current the reactive component grows nonlinearly, causing an magnetic losses increase and a decrease in the IM efficiency. The article analyzes the frequency-controlled IM operation modes in order to determine their operation optimal mode when the voltage and supply voltage frequency change, taking into account the nonlinear change in the saturation for the IM magnetic system. © 2021 IEEE.

Ключевые слова автора

current; energy efficiency; frequency; Frequency-controlled induction motor; load; losses; magnetic system saturation; voltage

Включенные в указатель ключевые слова

Engineering controlled terms
Electric drives; Electric traction; Energy efficiency; Magnetic circuits; Magnetic devices; Magnetic leakage; Semiconductor devices; Stators; Timing circuits; Voltage regulators; Winding

Engineering uncontrolled terms
'current; Frequency; Frequency-controled induction motor; Inductions motors; Load; Magnetic system; Magnetic system saturation; Operation mode; Supply voltages; System saturation

Engineering main heading
Induction motors

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Текст финансирования
The article was written under favourable circumstances of Faculty of Mechanical Engineering, University of Maribor, Slovenia. The authors want to thank Erasmus Mundus JointEU-SEE PENTA scholarship program, Slovenian Research Agency (research core funding No. P2-0063) as well as CAESS company for the research support.

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