

Theoretical analysis of the voltage unbalance factor to characterize unbalance problems in induction motors

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Abstract

Voltage Unbalance (VU) is one of the most common power quality problems in industrial electrical systems and it is a subject of systematic study. This problem affects the operation and the efficiency of Induction Motors (ims), which are the loads that demand more energy in the industrial sector with around 68%. The Voltage Unbalance Factor (VUF), defined by the international IEC standard, is the main factor used to characterize this problem. This article aims to present a theoretical analysis of VUF focused on its limitations for characterizing the effects of VU on ims. As a result of the analysis, it is shown that the use of the VUF indicator only is insufficient since it does not consider other aspects that affect the operation of the ims such as voltage variation. As an alternative, the use of the Complex Voltage Unbalance Factor and the Equivalent Voltage Magnitude Factor are suggested as parameters that, together with the VUF, allow deepening the characterization of the effects of the UV on the ims. © 2021 Praise Worthy Prize S.r.l.-All rights reserved.

Keywords

Complex voltage unbalance factor; equivalent voltage magnitude factor; Induction motor; Unbalanced voltage; Unbalanced voltage factor