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A Linear Relation for Voltage Unbalance Factor Evaluation in Three-Phase Electrical Power System Using Space Vector

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Abstract : The Voltage Unbalance Factor (VUF) index is recommended to evaluate system performance under unbalanced operation. However, its calculation requires complex algebra which limits its use in the field. Furthermore, one system cycle is required at least to detect unbalance using the VUF. Ideally unbalance mitigation must be performed within 10 ms for 50 Hz systems. In this work, a linear relation for VUF evaluation in three-phase electrical power system using space vector (SV) is derived. It is proposed to determine the voltage unbalance quickly and accurately and to overcome the constraints associated with the traditional methods of VUF evaluation. Aqaba-Qatrana-South Amman (AQSA) power system is considered to study the system performance under unbalanced conditions. The results show that both the complexity of calculations and the time required to evaluate VUF are reduced significantly.

Keywords : power quality, space vector, unbalance evaluation, three-phase power system
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