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An equivalent circuit model for a three phase harmonic mitigating transformer

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ABSTRACT

A harmonic mitigating transformer is capable of preventing the propagation of a triplen harmonic current from the secondary side of the transformer to the primary side. The transformer is able to achieve this via its zig-zag connected secondary windings. This investigation developed an equivalent circuit model for a harmonic mitigating transformer. The development of the model was based on the premise that a transformer can be modelled as a network of mutually coupled inductors. The equivalent circuit model was used to evaluate the transformer under ideal and non-ideal coupling conditions. The evaluation revealed that the non-ideal model is capable of mitigating more that 99% of the third harmonic current. This result showed that the non-ideal couplings within a harmonic mitigating transformer do not significantly affect its ability to mitigate the third harmonic. Consequently when seeking to optimise the harmonic mitigating transformer the area of focus should be on the couplings between windings on the same core limb rather than on the couplings between windings on adjacent core limbs.