DECLARATION

I declare that this dissertation is my own, unaided work. It is submitted for the Degree Master of Science in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

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ABSTRACT

In the recent past the Eskom network operated out-of-step at three occasions. Eskom questions whether the out-of-step relays responded as they should have. This is based on the fact that not all the out-of-step relays operated during these events.

This dissertation shows that shunts can make the impedance locus behave non-classically to the extent that the present practices Eskom uses for out-of-step relaying become inappropriate for application at certain busbars of the network. This is illustrated by showing that when the characteristic of the relay at Hydra, situated on the Mpumalanga side of Hydra, is set using the classical approach, the mentioned relay will not detect swings that have their electrical centre south of Hydra.

A modified two generator model is used to show the effect shunts have. The phrase “improved two generator model” refers to this model.

The improved two generator model is derived to represent the section of the Eskom network that links Mpumalanga to the Western Cape.
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