POSITIVE SEQUENCE TRANSMISSION LINE PARAMETER ESTIMATION USING SYNCHRONIZED SAMPLES OF VOLTAGE AND CURRENT PHASORS AT BOTH ENDS

Roul D. Martin

(ABSTRACT)

The objective of the project is to develop a method that can be used to estimate the positive sequence parameters of a short to medium length overhead transmission line. This method uses many samples of three-phase voltage and current phasors at both ends of the transmission line and concurrent measurements of the phase shift angle across the line. A very attractive feature of this method is that the line's conductor type and construction details are not required.

The original intention of the project was to remotely acquire a large number of measurements from both ends of a transmission line, perform measurement calibration to minimize bias errors and use the calibrated measurements to validate the method. However, a key measuring device with the ability to indirectly measure the phase shift angle across a transmission line, was not accurate enough to make the initial plan feasible.

In an effort to show that the method works, a load flow case from Power World Simulator was used instead. The method uses twenty (20) samples of positive sequence measurements from the load flow case to calculate the transmission line's positive sequence series conductance, series susceptance, and shunt susceptance using the Pi model representation of an overhead transmission line. The parameters estimated by the method are shown to be consistent with that of the line's database.

Additionally, the results of Measurement Calibration performed on the data acquired from the Duhaney/PAJ 69KV transmission line, are presented. The results show a 50% reduction in the Mean Absolute Value (MAV) of the MVA Equality Mismatch errors in the calibrated measurements when compared to the pre-calibrated.