Exploration of Ikaz and Normalized Hilbert Transform for Solving Faulty in Pipeline Distribution System Using Transmission Line Modelling

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Abstract. When there are sudden changes in fluid propagation in the pipeline system, pressure transient signal is generated. Due to the rapid pressure and fluctuation flow of the system (opening and closing of valve rapidly). A few group of researchers had use the pressure transient signal to detect and locate any uncertainties in the system (leak and blockage). Empirical Mode decomposition (EMD) will be as the demonizing method of pressure transient signal before proceeding to be analyzed further by using instantaneous frequency analysis in this research. EMD might be the step of decomposing the signal into intrinsic mode function, but this method have difficulties in selecting a suitable IMF. This paper proposed the uses of Integrated Kurtosis-based Algorithm for z-filter Technique (Ikaz) for that allows automatic selection of suitable and relevant IMF. This work shows the artificial pressure transient signal generates using transmission line modelling (TLM) in order to test the effectiveness of Ikaz as the autonomous selection of IMF. This paper implements the Normalize Hilbert Transform (NHT) as the instantaneous frequency analysis. A straight fluid network was designed using TLM fixing with higher resistance at some point that act as a leak and connecting to the pipe feature such as junction, pipefitting or blockage. The analysis results using Ikaz show that the method can be implement as an automatic selection of intrinsic mode function (IMF) although the noise level ratio of the signal is lower. Thus, Ikaz-kurtosis ratio is recommended to be implemented as automatic selection of intrinsic mode function (IMF) through NHT analysis.

Keywords: EMD, IMF, Pressure Transient, TLM, Ikaz , NHT