

RECOGNITION ELECTROMAGNETIC TRANSIENT PHENOMENA BY WAVELET TECHNIQUE AND APPLYING FOR THE VIETNAM POWER SYSTEM

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SUMMARY

This thesis studies electromagnetic transient phenomena recognition and electromagnetic transient analysis in time domain. Based on wavelet technique, z-transform and intelligent artificial, the thesis proposes some algorithms, softwares in order to reduce damage of transients due to excessive currents or voltage. These are needed for the design and testing of the wide-area protection and control systems of the power grid.

The objectives of this research are to develop a system of algorithms for power system transient identification and time domain simulation of power systems and to formulate a software applying for short circuit fault recognition and switching a power transmission line with no load case.

CONTRIBUTION

1. Using a suitable wavelet function (Daubechies, Haar) for recognizing transient phenomena.
2. A comprehensive comparisons of various techniques based on the use of wavelet technique and artificial intelligences such as PNN, Fuzzy Logic, Neuro-Fuzzy method is made with a same disturbance samples.

3. Study various detailed capacitor switching transients (isolated capacitor switching, magnification capacitor switching, parallel capacitor switching, restrike capacitor switching, prestrike capacitor switching).
4. Fast detection and localization of disturbances that may overlap in time and frequency in a noisy environment.
5. Using wavelet-based algorithm for time domain simulation by short circuit study in sample power system case. These results prove capability of wavelet-based algorithm for transient analysis due to comparison existing methods (runge-kutta method, trapezoidal method) in stability and accuracy.
6. The passivity requirement in representing the phase-domain characteristic impedance matrix for time-domain EM transient simulation is fulfilled in the most straightforward manner through the use of passive RLC circuits interconnected, and having their parameters directly identified to match the nonlinear frequency dependence of the matrix function. The interconnected RLC circuits which are synthesized are an inherently stable network.

SCIENTIFIC AND PRACTICAL IMPLICATIONS

Scientific contribution

The thesis has used the mathematical tools such as wavelet technique, z-transform, artificial intelligent to build algorithms solve recognizing and assessment power system transient.

Practical contribution

Results of the thesis is a basis of study electromagnetic transient in Vietnam and a good application software for businesses of engineering.

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