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MONITORING TRANSIENT PHENOMENA IN POWER NETWORKS: THE KEYPOINT OF ENERGETIC DISTRIBUTION SECURITY

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Rezumat. *Semnalele tranzitorii generate de sistemele electrice au origini diferite și pot fi considerate ca fiind normale sau deficiente. Monitorizarea și analiza lor este crucială atunci când fenomenele generate de acestea pot duce la distrugerea totală sau parțială a sistemului. Datorită aparițiilor scurte ale acestora, analiza semnalelor tranzitorii este o provocare în domeniul procesării semnalelor. În această lucrare sunt prezentate mai întâi diferite metode operaționale de analiză a semnalelor tranzitorii generate de sistemele electrice. Sunt investigate și testate pe date reale câteva clase pentru analiza semnalelor tranzitorii. Experimentele prezentate au fost realizate în colaborare cu departamentul de cercetare dezvoltare din cadrul EDF (Electricité de France) în perioada 2007-2009.*

Abstract. *Transient signals generated in electrical systems are different origins and they could be considered as normal or as default. Their monitoring and analysis is crucial while the phenomena behind them could lead to a partial or total destruction of the system. Because of their brief occurrence, the transient signal analysis is a challenging field in signal processing domain. In this paper, we illustrate firstly the different operational methods to deal with the transient signals issued from electrical systems. Some classes for transient signal analysis are investigated and tested on real data. The experiments presented have been done in collaboration of EDF (Electricité de France) R&D department in the period 2007-2009.*

Keywords: transient signals, wavelet transform, energy distribution system, partial discharge, signal's distribution

1. Transient phenomena in power networks

Transient signals generated by electrical systems (in production, transport, distribution and consumption) have different origins and can be considered normal or materializing a fault. Such is the case of partial discharges (PDs) which are among the most frequent causes of breakdown in the electrical systems because, according to [IEC2000], 30% of the breakdowns in the electrical systems are due to the defaults in isolation. The partial discharges can appear in the entire production-transport-distribution channel, as illustrated on several examples in the figure 1, and can be caused by the material's wear and fatigue, humidity, manufacturing problems, etc.

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