Multiscale signal processing for THEM

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Abstract - Currently, THEM signals are proper for post-processing : noise levels after preprocessing are acceptable. The best way to get an edge over the competition is to have a much better post-processing approach. This preliminary report proposes a wavelet-based post-processing approach. It is intended to serve as a basis for discussion.

I. MULTISCALE SIGNAL PROCESSING

In most new high performance processing algorithm, multiscale processing plays a role. Just like before you can read the paper, your brain first has to find the table, then the paper on top of the table and finally focus on the printed characters, new computer algorithms process the data sequentially starting from coarse scales and going down to the details where needed.

These algorithms are not only fast, but they are also much more robust. Just like you are unlikely to miss the table, then miss the paper on the table... and iterative process makes sure that low noise levels don't become a nuisance (after all, noise is often not visible at coarse scales).

II. MULTISCALE PROCESSING FOR ANOMALY DETECTION AND CHARACTERIZATION

Anomalies are visible at frequencies below a certain threshold (to be set). Once a possible anomaly is detected in these lower frequencies (coarse scales), processing higher frequencies will allow the algorithm to discard false anomalies and categorize *bona fide* anomalies. This can probably be best achieved using a Karhunen-Loève / correlation approach or other statistical analysis (including Neural Networks). Using a preliminary coarse scale analysis, this approach would leave a record for human inspection.

III. CONCLUSION

Such an algorithm would be fast and robust. While it might require some time to set in place, it would definitively outmatch transfer functions analysis or multichannels plots.

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