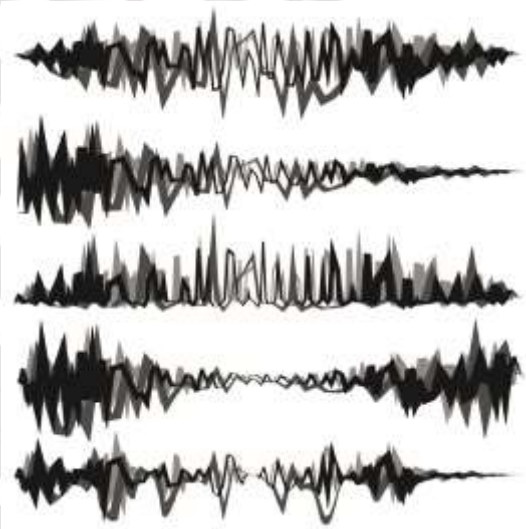

SEPARATING THE NOISE FROM THE DATA IN NUCLEAR POWER PLANTS

Mahesh D. Pandey & Bo Li

To ensure nuclear power plants are running safely, operators closely scrutinize a slew of different measurements, monitoring for any signs of wear-out. Take the example of the electro-hydraulic system controlling the plant's turbines. Operators collect weekly samples of the control fluid, looking for an uptick in acids that indicate the fluid is starting to break down.

The problem is deciphering what are the important, underlying trends and what is simply noise in the data — short-term fluctuations caused by variations in the chemical processes and environment.

Standard statistical analysis methods like least-squares regression and stationary time series analysis don't work because that noise component can vary in complex, time-dependent ways. That's why WISE investigator Mahesh Pandey and research associate Bo Li are proposing a different approach: empirical mode decomposition.

Borrowed from climate and geophysical sciences, this method starts with the graph of data points plotted over time and breaks it down into a number of component waves, along with an underlying trend line. A simple statistical significance test reveals which oscillating waves represent noise that can be ignored. Once you've eliminated the noise data, you can recombine the "real" waves with the trend line to produce a clean graph.

Pandey and Li used simulations to test this approach and then applied it to real data taken from control fluids at a nuclear plant. The results gave plant operators a clear picture of acid levels in the fluid — and hence how well the plant's maintenance methods are working.

Researchers: *Mahesh D. Pandey, Bo Li*

Partners: *The Natural Sciences and Engineering Research Council of Canada, The University Network of Excellence in Nuclear Engineering,*

READ FULL ARTICLE