THE UTAH NUCLEAR ENGINEERING PROGRAM presents:

Pressure Sensing Line Diagnostics Using Noise Analysis

Tues., March 22, 2016
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4:00 P.M. – 5:00 P.M. in WEB L104

Abstract:
Small random fluctuations in the measured signals within a power plant contain valuable information about the system itself. These signatures can be scrutinized using a technique that the nuclear power industry has traditionally referred to as noise analysis. For instance, the stochastic processes within a nuclear reactor produce small perturbations that permit identification and quantification of its characteristics.

In electrical power plants, instrument lines are used to site sensors and transmitters away from harsh environments near the main functional equipment. In this research, the electrical-hydraulic analogy is employed in conjunction with an equivalent pi representation to model pressure sensing lines. An equivalent pi representation is selected because it provides an exact representation of the transfer function. Anomalies such as leakage, voids and blockage alter the normal system transfer function in such a manner that fault detection and identification can be performed. In particular, the resonant frequencies and peak magnitudes provide a fingerprint of the sensing line health, and pinpoint the location of the anomaly. These models are verified using sampled measurement data obtained from operational electric generating stations. The overall objective is to utilize the natural fluctuations in fluid pressure within the hydraulic system to passively perform real-time fault diagnostics on the instrument lines, with the ultimate goal being to assure uninterrupted system operations.

Short Biography:
Keith Holbert is presently an Associate Professor in the School of Electrical, Computer and Energy Engineering of Arizona State University (ASU). He earned his Ph.D. in nuclear engineering from University of Tennessee in 1989. His research expertise is in the area of instrumentation and system diagnostics including radiation effects on sensors. Keith has performed tests on safety-related systems in more than a dozen nuclear power plants in the U.S. Dr. Holbert is a registered professional (nuclear) engineer. Keith is Senior Member of IEEE, and a member of the American Nuclear Society as well as the American Society for Engineering Education. He has published more than 180 journal articles and conference papers, two textbooks, and holds one patent. Keith is the Director of the Nuclear Power Generation Program at ASU.