

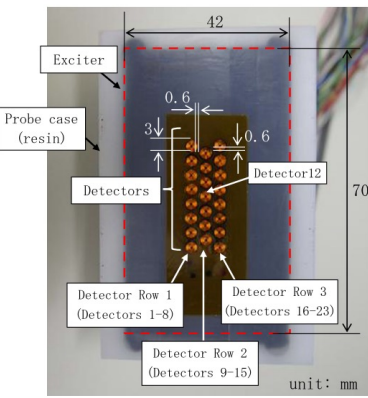
Safety Engineering of Nuclear Systems Measurement Technology and Reliability Quantification



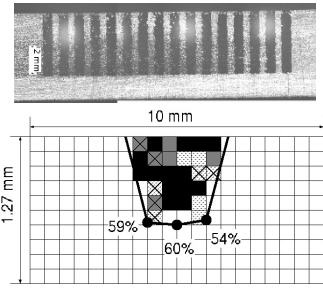
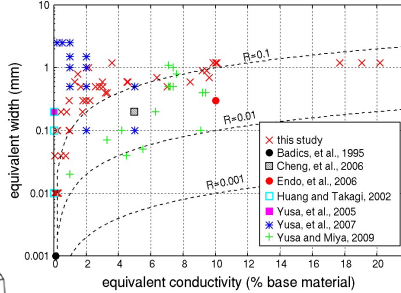
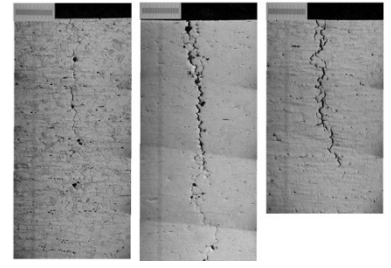
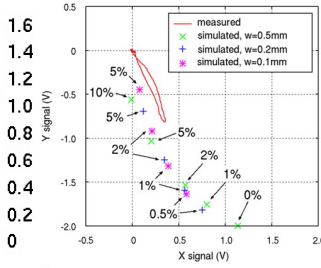
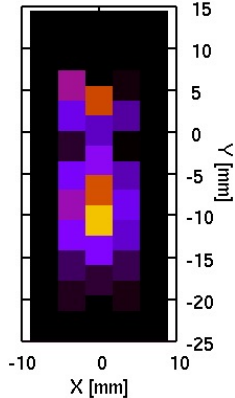
Prof. YUSA Noritaka

For the safety, economic efficiency, and reliability of large structures

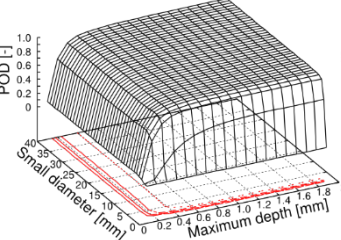
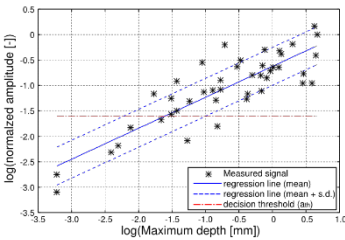
Assuring the integrity of large structures including nuclear power plants is one of the most important issues in the present-day society. Since the aging of structures is essentially inevitable, proper maintenance actions should be taken to utilize structures safely while keeping its economic efficiency. To contribute to this, we have performed various researches mainly concerning nondestructive testing and evaluation that are indispensable for formulating proper maintenance actions.



An arrayed probe for monitoring surface breaking cracks

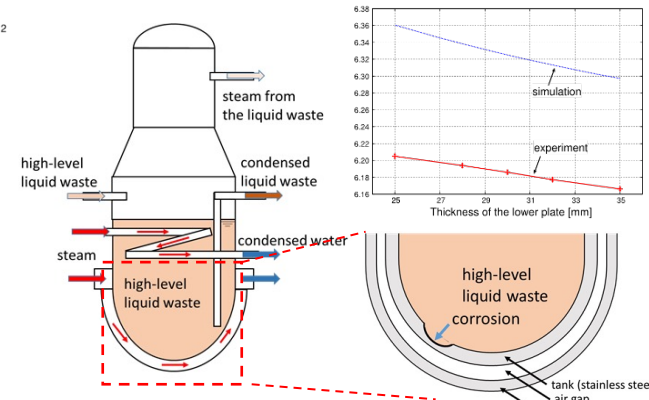


Numerical modeling and inverse analyses to characterize flaws



$$\begin{aligned} \text{LnL} &= \sum_{i=1}^{M_l} \ln \Phi \left(\frac{V_i - (\mu_1 V^{sim}(d_i, l_i) + \mu_2)}{\sqrt{V^{sim}(d_i, l_i)^2 \sigma_1^2 + \sigma_2^2}} \right) \\ &- \frac{1}{2} \sum_{i=M_r+1}^{M-l} \left[\ln \{ 2\pi (V^{sim}(d_i, l_i)^2 \sigma_1^2 + \sigma_2^2) \} + \frac{\{ V_i - (\mu_1 V^{sim}(d_i, l_i) + \mu_2) \}^2}{V^{sim}(d_i, l_i)^2 \sigma_1^2 + \sigma_2^2} \right] \\ &+ \sum_{i=M-M_r+1}^M \ln \left(1 - \Phi \left(\frac{V_r - (\mu_1 V^{sim}(d_i, l_i) + \mu_2)}{\sqrt{V^{sim}(d_i, l_i)^2 \sigma_1^2 + \sigma_2^2}} \right) \right) \\ \text{POD}(d, l) &= \Phi \left(\frac{(\mu_1 V^{sim}(d, l) + \mu_2) - V_{th}}{\sqrt{V^{sim}(d, l)^2 + \sigma_2^2}} \right) \end{aligned}$$

Development of new mathematical formulations to evaluate the probability of detection capability



Development of a new technique to inspect components where no conventional one is applicable

Research Topics

- Development of nondestructive testing and evaluation techniques using DC-GHz electromagnetic fields, including probe design, numerical modeling, signal processing, inverse analysis and so on.
- Development of nondestructive inspection techniques using guided waves and related matters for the structural health monitoring
- Development of methods to probabilistically analyze signals of nondestructive inspections for evaluating the safety of structural components