

# **NDT Eddy Current application on steam generator tubes samples with several levels of cracking**

**Fannie MEYER<sup>1</sup>, Eilin Guillot<sup>1</sup>, Gilles Girard<sup>1</sup>, Pierre Thomas<sup>1</sup>, Remy Bonzom<sup>2</sup>,  
Thierry Ghys<sup>2</sup>, Alexis Lorin<sup>2</sup>, Patrick Le Delliou<sup>2</sup>**

<sup>1</sup>ERMES, EDF R&D, France, <sup>1</sup>MMC, EDF R&D, France

When a steam generator in a nuclear power plant is end-of-life, the technical expertise of the many tubes from which it is composed provides useful data on its running conditions and its state of deterioration. The diagnostic and analysis performed by experts are complex. In order to improve the understanding of the NDT, the R&D department of EDF worked on a means of generating natural cracks in the inner face of tube samples, in order to obtain several degraded states, representing different portions of tubes we may find in a steam generator. Being able to monitor and estimate these cracks is essential. Stress corrosion cracking tests with a constant strain were performed to generate these cracks on the inner diameter of the tube samples. The imposed strain for these tests was previously calculated using finite element method, in order to control the extent of the cracks. In order to monitor the cracks generated inside the samples, the Eddy Current NDT, well adapted to this issue, has been applied in our lab. Two well fitted probes have been tested: a transverse rotating probe and an X-probe. The signal analysis allowed us first to determine if cracks are through or not, and then gave information to estimate the shape, the dimensions and the depths of the different generated flaws, by comparing with signals obtained on calibrated defaults at our disposal, such as notches.