

CRIEPI Develops New Ultrasonic Testing Technique

On November 30, the Central Research Institute of the Electric Power Industry (CRIEPI) announced that it had developed a new ultrasonic testing technique called SPOD (short for "short path of diffraction"), enabling it to measure the depth of cracks more easily, quickly and cheaply than conventional nondestructive testing methods.

Traditionally, edge echo techniques and TOFD (short for "time of flight diffraction") testing have been used at thermal and nuclear power plants to measure the depth of cracks in welded pipe segments. Both, however, present various problems: edge echo techniques are complicated to implement, and TOFD cannot be used on stainless steel or other thick-walled structures.

In the SPOD technique developed by CRIEPI, ultrasonic waves are emitted into a crack using an oblique-angled probe, and diffracted waves from the crack are received by a probe located vertically above it. The received echoes consist of two components: one propagated from right above the crack, and the other propagated upward after being reflected from the bottom. The crack depth can then be easily measured based on the time difference between the two echoes.

CRIEPI says that the new method takes care of the deficiencies of conventional methods, making it possible to accurately measure the depth of a crack inside a metal structure more easily, quickly, and cheaply. Not only can the new technique be used in piping, but also in such large steel structures as bridges.

CRIEPI noted several points in SPOD still be improved: (1) improving testing accuracy (signal-to-noise ratio) by optimizing measurement conditions in the SPOD technique, using ultrasonic propagation simulations, which CRIEPI has already developed; (2) clarifying applicability to parts other than flat panels and straight pipes (bended piping, for example), where TOFD techniques cannot be used; and (3) ascertaining applicability to stress corrosion and other cracking that has already been confirmed at actual plants.

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