

Application method of phased array ultrasonic testing to jet pump beam installed in a reactor pressure vessel

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Jet pumps installed inside of Reactor Pressure Vessel (RPV) of Boiling Water Reactor (BWR) nuclear power plant have the function to circulate cooling water through the core region in RPV. Jet pump beam is one of parts consisting jet pump assembly. Jet pump beam could have potential of intergranular stress corrosion cracking, depends on high stress, poor materials properties and water environment. Due to this reason, it is important to check the soundness of jet pump beam. Jet pump beam is inspected by Ultrasonic Testing (UT) at US BWRs. Since the flaw inspection man-hours increase when jet pump beams are taken out from the RPV, in-vessel inspection is preferable. In this study, we have developed an application Phased Array UT (PAUT) technology to the flaw detection of jet pump beam without taking out from RPV. Furthermore, access devices have been developed. The devices can access and detect the entire surfaces of jet pump beam as the condition that it is installed in RPV by applying PAUT technology. In this paper, we report the results of flaw detection on the top tapered region of the jet pump beam and the top inner surface of the bolt hole, where cracks could be occurred.