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1235 Howe

Pipeline Break Mechanism in Mihama Power Plant Caused by Flow Accelerated Corrosion with High Intensity Swirling Flow

Pipeline break mechanism in Mihama Power Plant is known one of the wall thinning accident in Japan (2004), which is caused by flow accelerated corrosion (FAC), where FAC is a corrosion phenomenon of a pipeline combined with flow turbulence.

The Mihama pipeline consisted of an elbow and orifice, while the flow was highly swirling in the upstream. The water tunnel experiment indicated that the mass transfer coefficient was locally increased behind the orifice to a value several times larger than that of the straight pipe. This phenomenon was mainly caused by the high intensity swirling flow through the elbow, which generated a spiral motion downstream of the elbow and sustained a longer distance than expected from an elbow flow without swirl. This type of non-axisymmetrical flow triggered strongly biased flow at the orifice, which resulted in non-axisymmetric deep pipe-wall thinning downstream of the orifice.

Dr. Fujisawa is a Professor in Department of Mechanical Engineering at the Niigata University. He received a PhD degree in Mechanical Engineering from Tohoku University. He worked as a Research Associate and Associate Professor at Gunma University before moving to Niigata University. He has studied various flow visualization techniques, such as the flow visualization (smoke-wire, oil film, tuft, particle), scalar measurement (laser-induced fluorescence, temperature sensitive liquid crystal, shear-sensitive liquid crystals, flame reaction) and velocity vector measurement (planar, stereo, scanning particle image velocimetry). These experimental flow visualization techniques were applied to study various flow fields, such as wind and water turbines, jets, plumes, combustions and so on. Recently, he has been working on Flow Accelerated Corrosion (FAC) and Liquid Droplet Impingement (LDI) erosion, which is closely related to the pipe-thinning accidents of Mihama Nuclear Power Plant (NPP) in 2010. Professor Fujisawa was the Director of Flow Visualization Society of Japan, Managing Editor of J. Visualization, and President of Visualization Research Center of Niigata University more than a decade. Now, he is working as a Vice president of Flow Energy Society of Japan and as an Editor-in-Chief of J. Flow Control, Measurement and Visualization. Now, he is a Technical Committee Member for Niigata Prefecture, which is one of famous prefectures for NPP in Japan.