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# ABSTRACT

## Analysis of Cross-Flow Induced Vibrations in the Jet Pump Assembly of the Cooling System of a BWR-5 Reactor

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The jet pumps of a BWR-5 nuclear reactor are part of the core cooling water system. This system has 20 jet pumps in the annular zone between the core casing and the reactor vessel. Its function is to force the flow of water through the core to regulate the power of the nuclear reactor. This paper reports the cross-flow-induced vibrations generated by the suction flow of the reactor's annular section. A Computational Fluid Dynamics (CFD) analysis was performed in the Fluent module of ANSYS, using a RANS (Reynolds Averaged Navier-Stokes) approach with the K-omega turbulence model. The results obtained in the time domain were transformed to the frequency domain using the Fast Fourier Transform (FFT) to estimate the vortex generation frequencies. Then, this data was compared with the natural frequencies of the structure, which were obtained by fluid-structure analysis (FSI). The first four natural frequencies were 27.4 Hz, 38.9 Hz, 39.9 Hz, and 41.5 Hz. The frequencies induced by the cross-flow do not enter in structural resonance. Consequently, the structural integrity of the system can be guaranteed under ordinary operating conditions.