

## Root Cause Analysis of Excessive Vibration in a Feeder Pump of a Large Thermal Electric Power Plant: A Simulation Approach

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**Abstract :** Root cause Identification of the Vibration phenomenon in a feedwater pumping station was the main objective of this research. First, the mode shapes of the pumping structure were investigated using numerical and analytical methods. Then the flow pressure and streamline distribution in the pump sump were examined using C.F.D. simulation, which was hypothesized can be a cause of vibration in the pumping station. As the problem specification of this research states, the vibration phenomenon in the pumping station, with four parallel pumps operating at the same time and heavy vibration recorded even after several maintenance steps. They also specified that a relatively large amplitude of vibration existed by pumps 1 and 4 while others remain normal. As a result, the focus of this research was on determining the cause of such a mode of vibration in the pump station with the assistance of Finite Element Analysis tools and Analytical methods. Major outcomes were observed in structural behavior which is favorable to the vibration pattern phenomenon in the pumping structure as a result of this research. Behaviors of the numerical and analytical models of the pump structure have similar characteristics in their mode shapes, particularly in their 2nd mode shape, which is considerably related to the exact cause of the research problem statement. Since this study reveals several possible points of flow visualization in the pump sump model that can be a favorable cause of vibration in the system, there is more room for improved investigation on flow conditions relating to pump vibrations.

**Keywords :** vibration, simulation, analysis, Ansys, Matlab, mode shapes, pressure distribution, structure

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