

ABSTRACT

Cavitation is one of the factors causing the performance reduction on centrifugal pump. On the centrifugal pump, cavitation can occur at the suction side of the pump and pump impeller. The indication of cavitation phenomenon is the emergence of steam bubbles, vibration and noise in the pump. Cavitation may affect the performance of the pump causing damage to the inner parts of the pump. Such damage can harm the production process and require substantial maintenance costs. In the industrial world, if the components of the used machine are in good condition, then the level of industrial productivity will be high. Therefore, a method for detecting cavitation of a centrifugal pump is required. This research was conducted to develop method which detecting cavitation in centrifugal pump vibration signal frequency domain based with mechanisms of the closed valve resistance which can cause cavitation .

In this study, cavitation was detected using vibration signal obtained from accelerometer Brüel & Kjær type 4507 B. The obtained data from the pump with cavitation were transformed into frequency domain (spectrum) using Fast Fourier Transform (FFT). This spectrum was then compared to the spectrum obtained from the pump conditions without cavitation. The variation of the pump operating conditions which used in this study was the variation of the closed valve which provided resistance so that the flow became turbulent and created cavitation. Such variation as a mechanism for establishing a cavitation level on a test plant. Variations of the closed valve consist of valves with 360° , 720° , 1080° , and 1440° .

The results showed that the cavitation phenomenon on centrifugal pump could be detected by using frequency domain based on vibration signal analysis method. The cavitation indication was seen due to an increase in the amplitude value at the frequency of the component where the cavitation occurred, such as the shaft frequency (24.7 Hz) and pump impeller (149 Hz). The developed method might indicate the cavitation phenomenon at the cavitation level which began to form on the impeller's blade. Characteristics of the frequency domain (spectrum) of pump conditions with cavitation had increased the amplitude values significantly at 24.7 Hz (f_0), 99.9 Hz ($4xf_0$) and 149 Hz ($6xf_0$) frequencies.

Keywords : Centrifugal pump, cavitation, frequency domain, *accelerometer*