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EXPERIMENTAL MODAL ANALYSIS OF A GEAR PUMP

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A significant part of machines and mechanisms failures are caused by fatigue break of components under dynamic loads. It is necessary to know the resonant frequencies and vibrational mode shapes in order to prevent damage from vibration [1, 2, 3].

The reference case is a pressure compensated external gear pump. The weight of the pump is approximately 10 kg and standard shake tables cannot provide the required vibroexcitation frequency range due to the stiffness and mass of the pump body. For vibroexcitation, an impedance hammer with integrated load cell made by PCB was used. The pump was placed on top of a rubber mat on top of a solid surface. A three-component laser vibrometer PSV-3D-400 was used for data acquisition [4] of the surface vibration. The frequency response was obtained due to the impact hammer produced a structural resonant response (Fig. 1).

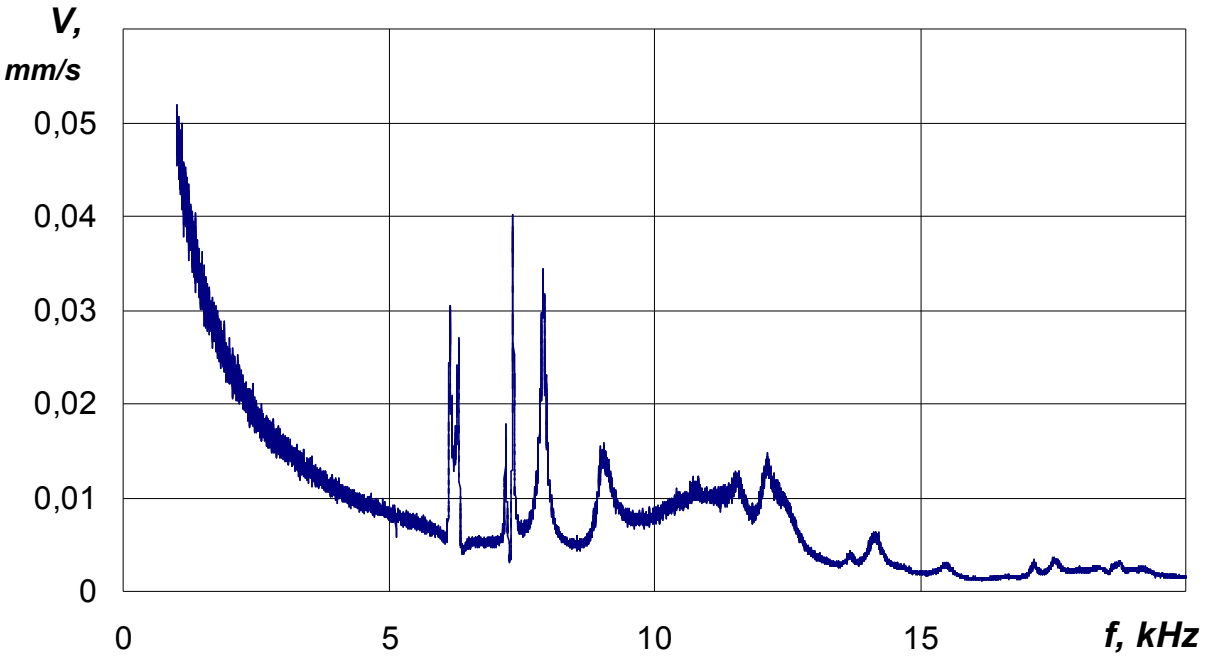

Figure 1. The range of vibration velocity, averaged by all scanned points

As a result of the modal analysis, the resonant frequencies were identified and the gear pump vibration modes can be obtained. The first four experimentally measured resonant frequencies of the pump were 6153, 7204, 7338 and 7908 Hz. The experimental study will allow to verify the mathematical model of the pump.

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