Influence of the Cavitation on the Characteristics of Hydrodynamic Oscillation Generators

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1. Introduction. Wave technologies **[**1**]** make it possible to obtain high-quality materials and products at reducing energy expenditure. Hydrodynamic oscillation generators are the main elements of wave devices [2]. The optimization of their parameters for different fields of applications is an important problem. The purpose of this study is to experimentally and numerically investigate the cavitation effect on the amplitude-frequency characteristics of the oscillations. It is shown that at the absence of the cavitation the spectrum has only one main peak in low- frequency region. The cavitation causes many other peaks in high-frequency range.

2. Experimental. The scheme of the experimental setup was shown in [3]. In this study, are presented the results for a cylindrical generator with a channel diameter 7 mm and a length of 35 mm. The working fluid (tap water) was supplied through two tangential orifices of 2.8 mm in diameter. The spectra were obtained with the help of a Lecroy Wave Surfer WS-424 oscillograph.

3. Mathematical model. The system of averaged continuity equations and Navier-Stokes equations for axial-symmetric flow, the two-parameter model of turbulence, and the full cavitation model were used [4]. The scheme of the computational domain and boundary conditions are presented in [4].

3. Results and Discussion. The calculations show that at the liquid flow rate 13 dm^3/min there is no cavitation in the generator. In this case the spectrum has only one main peak at the frequency 0.3 kHz (Image 1). At the liquid flow rate 22 dm^3/min the cavitation exists, the spectrum has many other peaks in a range of frequencies 0.5 ... 20 kHz (Image 2).

4. Conclusions. The complex experimental and numerical study of flow-type hydrodynamic oscillators of the vortex type has been carried out. **T**he amplitude-frequency characteristics of the oscillations were obtained in the cases of the absence and the presence of the cavitation.

5. References

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[3] O.V. Shmyrkov, *Fluid Dyn.* **50** (3), (2015), p. 332.

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