3 Stabilizing construction

Also the effect of stabilizing construction (cross) on the pulsating characteristics of flow was studied. This study was carried out on an experimental model modification without runner and with three different opening angles of guide vanes.

Figure 6 shows typical spectra of pressure pulsation for the cases without cross (a) and with cross (b). It is clearly seen that the stabilizing contracture reduces the amplitude of the pressure pulsation and slightly changes the frequency of the pulsations.

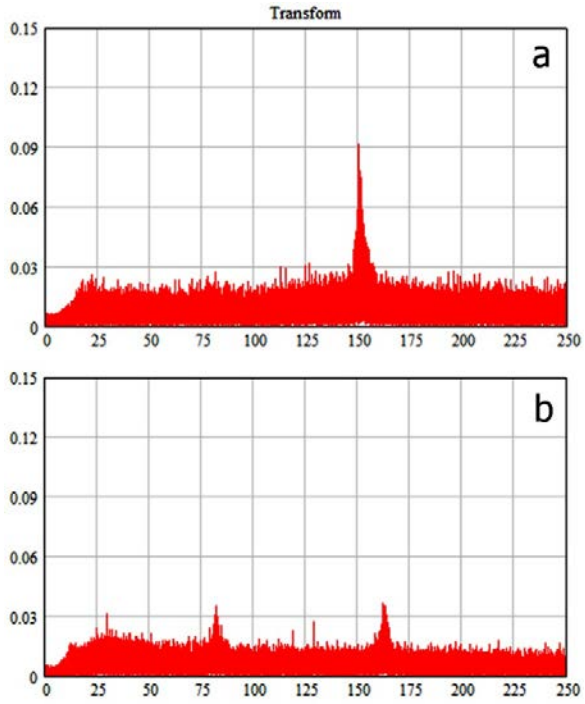

Fig. 5 - Spectra of pressure pulsation without cross (a) and with cross (b)

The model is designed in such a way that makes it easy to install and investigate any types of stabilizing structures (ribs, runner cowl, cross, and combinations thereof). These studies are also conducted.

4 Conclusion

As a result of work established that the cause of pressure pulsations in the flow path and as a consequence of large dynamic loads on all the units of hydraulic turbine is the forming of precessing vortex core downstream the runner.

The profiles of velocity components and pressure pulsation in draft tube diffuser for different operation modes of the turbine were measured. Frequency and intensity of pressure pulsations to the flow rate and speed of runner dependence experimental studied.

Analysis of the measured velocity profiles in the diffuser of the draft tube showed that on modes with the precessing vortex a vast recirculation zone with high-speed reverse flow is formed. Thus, it is shown that the components of the flow velocity behind the runner can serve as indicators characterizing the intensity of unsteady phenomena in the draft tube of hydraulic turbines.

The positive effect of stabilizing constructions on the pulsation intensity in the draft tube diffuser is shown.

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