

## 6 - 14 The Performance Experiment of the LBE Pump Under Water

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As one of the key equipment of the reactor, the performance of the LBE pump will directly affect the reactor safety. Recently, the LBE pump for the comprehensive test platform has been manufactured. In order to obtain the performance data of this pump, calibrate the design value and calculation model, the performance experiment has been conducted under water before the test under LBE.

The experiment contains three parts: performance test, level control test, and pressure pulsation measurement. The performance test is to measure the pressure head of the pump at different operating frequencies and flow rates, compare it with the design value and the CFD calculation value and roughly predict the performance under LBE. The level control test is to Validate the effect of the automatic pump chamber level control scheme. The pressure pulsation measurement is to measure the pressure pulsation value at the outlet under different operating conditions, and provide these data to the LBE instrument calibration device for device uncertainly calculation.

The results shows that the pressure head of the pump exceeds the design parameters by about 11% at 25 Hz, and the performance curve is close to the CFD transient calculated results. The pump chamber level fluctuation is small during normal operating, and the gas system can quickly adjust the air pressure to restore the liquid level to specified range when the liquid level exceeds the specified range artificially which indicates that the level control scheme is feasible. The pressure pulsation frequencies are 24.8, 124.0 and 248.2 Hz under the rated flow rate of 25 Hz, which are respectively the shaft frequency, the leaf frequency and the multiplier frequency of the pump, indicating that the pressure pulsation is mainly caused by the pump shaft and impeller rotation. The maximum pressure pulsation is about 3% under this operation condition. which can be used as input parameters for the system analysis of LBE instrument calibration device.

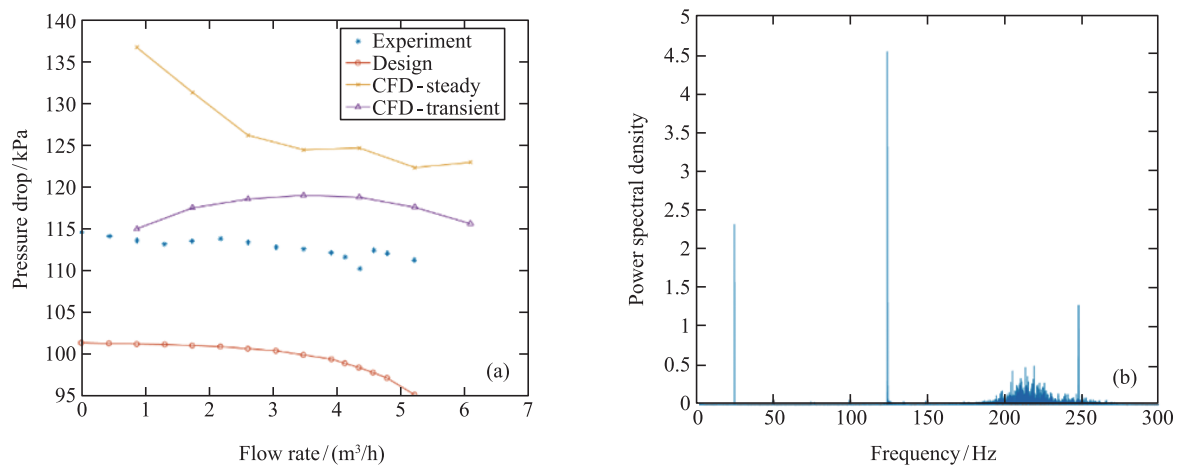


Fig. 1 (color online) The results of performance experiment of the LBE pump under water. (a) The performance of the pump under 25 Hz, (b) The pressure pulsation spectrum under the rated flow rate of 25 Hz.