



Hydraulic Pump Fault Diagnosis Based on Empirical Wavelet Transform and Extreme Learning Machine



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Research Objective

The method is proposed to recognize the conditions of a hydraulic pump quickly and effectively.

A hydraulic pump plays an important role in a hydraulic system and reflects whether the operation of the entire system is normal or not. This study provides a fault diagnosis method for hydraulic pump using empirical wavelet transform (EWT) and extreme learning machine (ELM).

Expected Contributions

- EWT can decompose the original vibration signals adaptively and obtain appropriate features from non-stationary vibration signals.
- ELM model is an effective tool for dynamic fault classification.
- The method not only processes non-stationary signals but also stationary signals. Thus, the method can be generalized and applied to the other vibration signals of pumps.

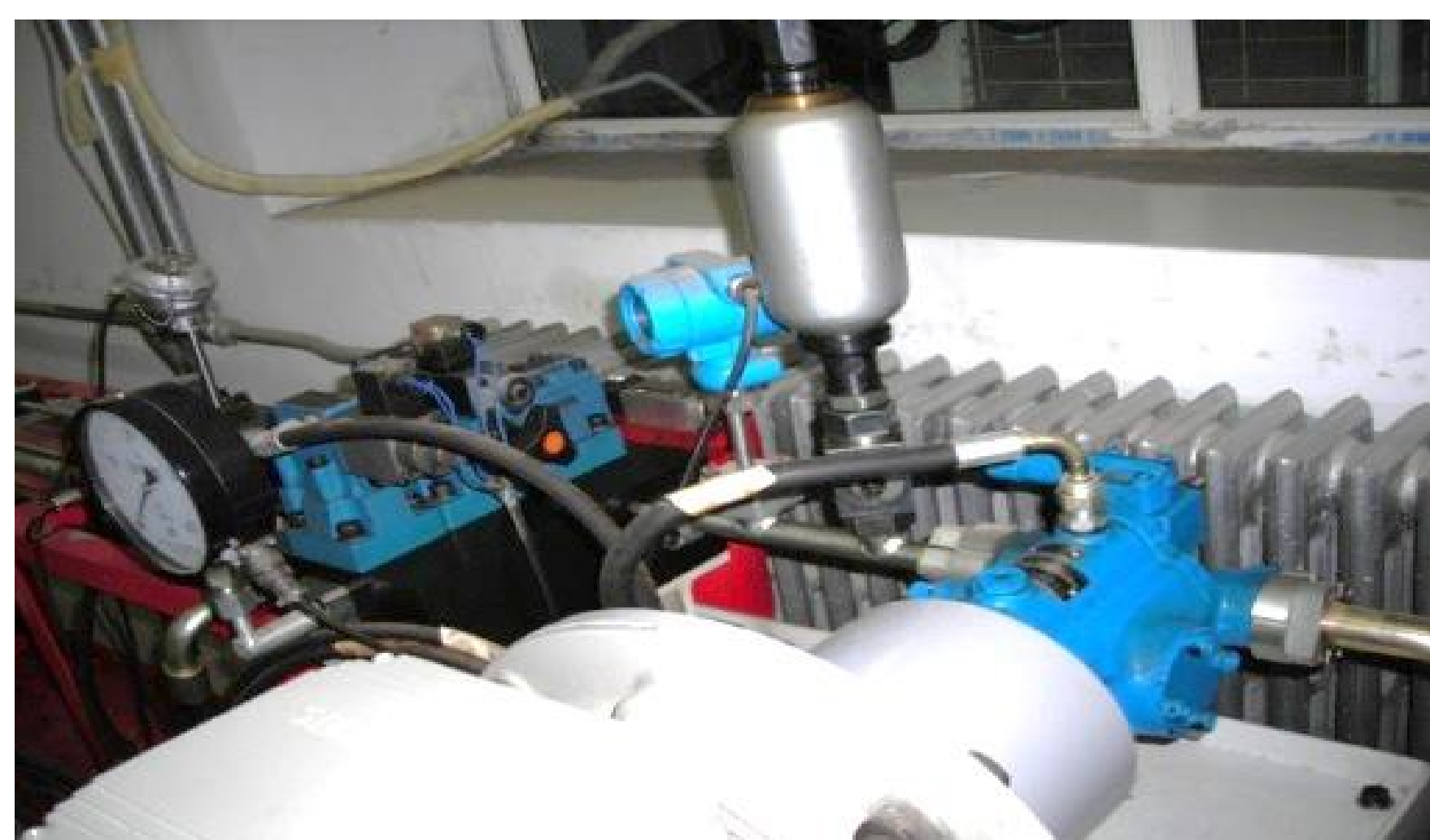
State of Research

The result shows that the fault diagnosis based on EWT-ELM method reaches the accuracy of 100% on the data collected from our experiments, which indicates that the proposed is capable of distinguishing the state of pump under different fault modes.

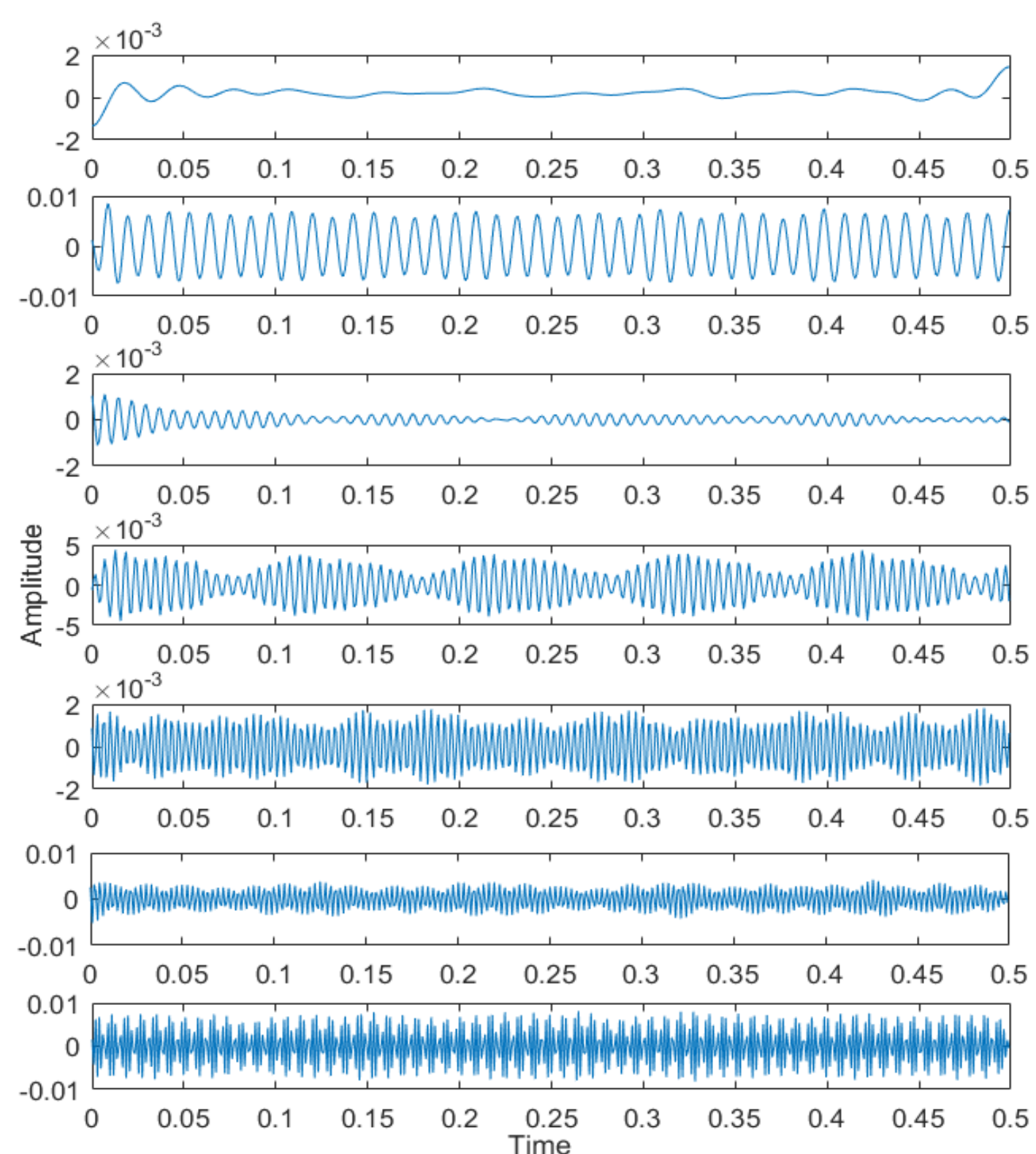
Next Steps

- Additional fault modes should be taken into consideration to achieve a better performance on hydraulic pump fault classification.
- Moreover, more data sets collected from other pumps could be used to validate the effectiveness of the proposed method.

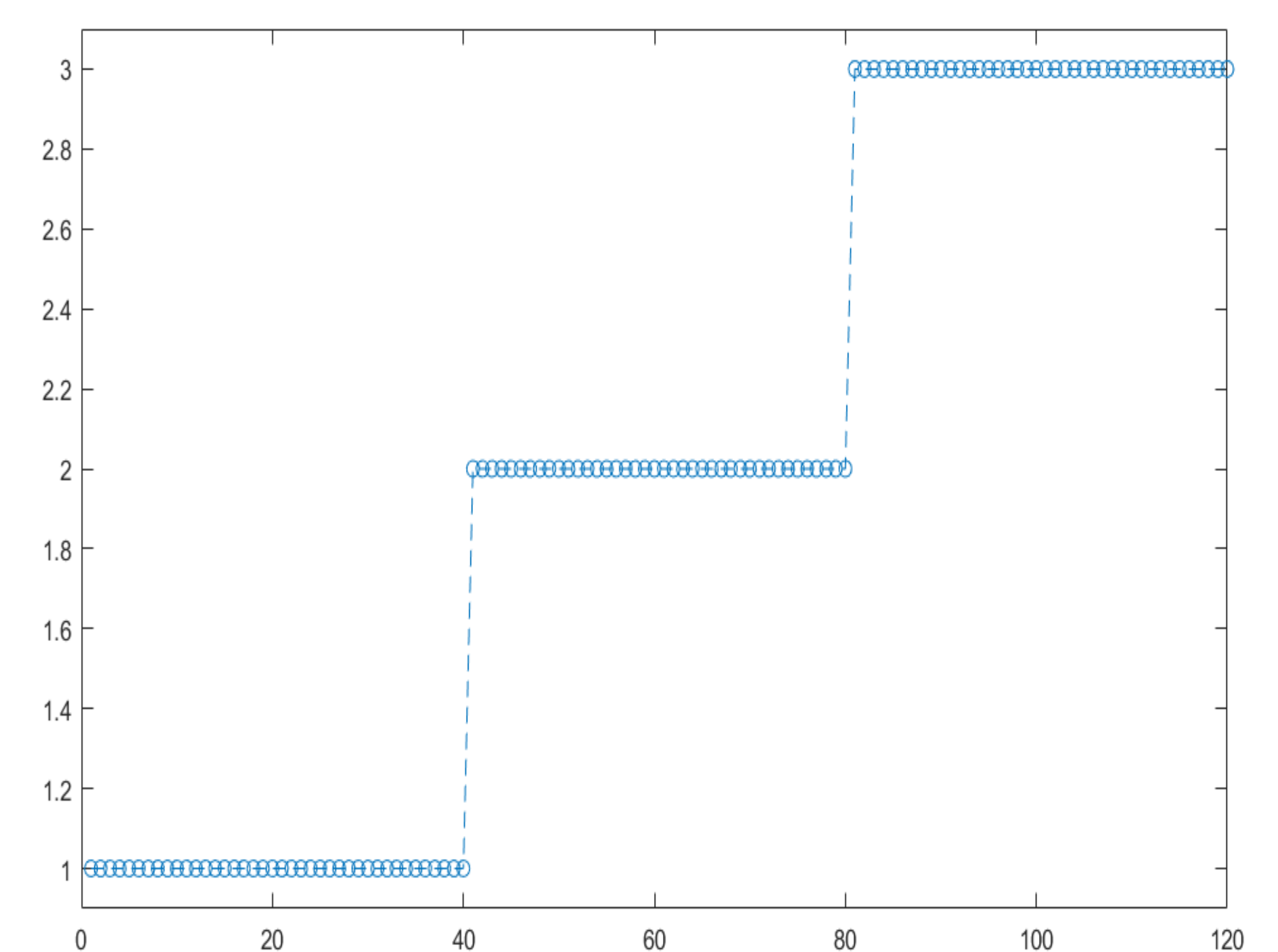
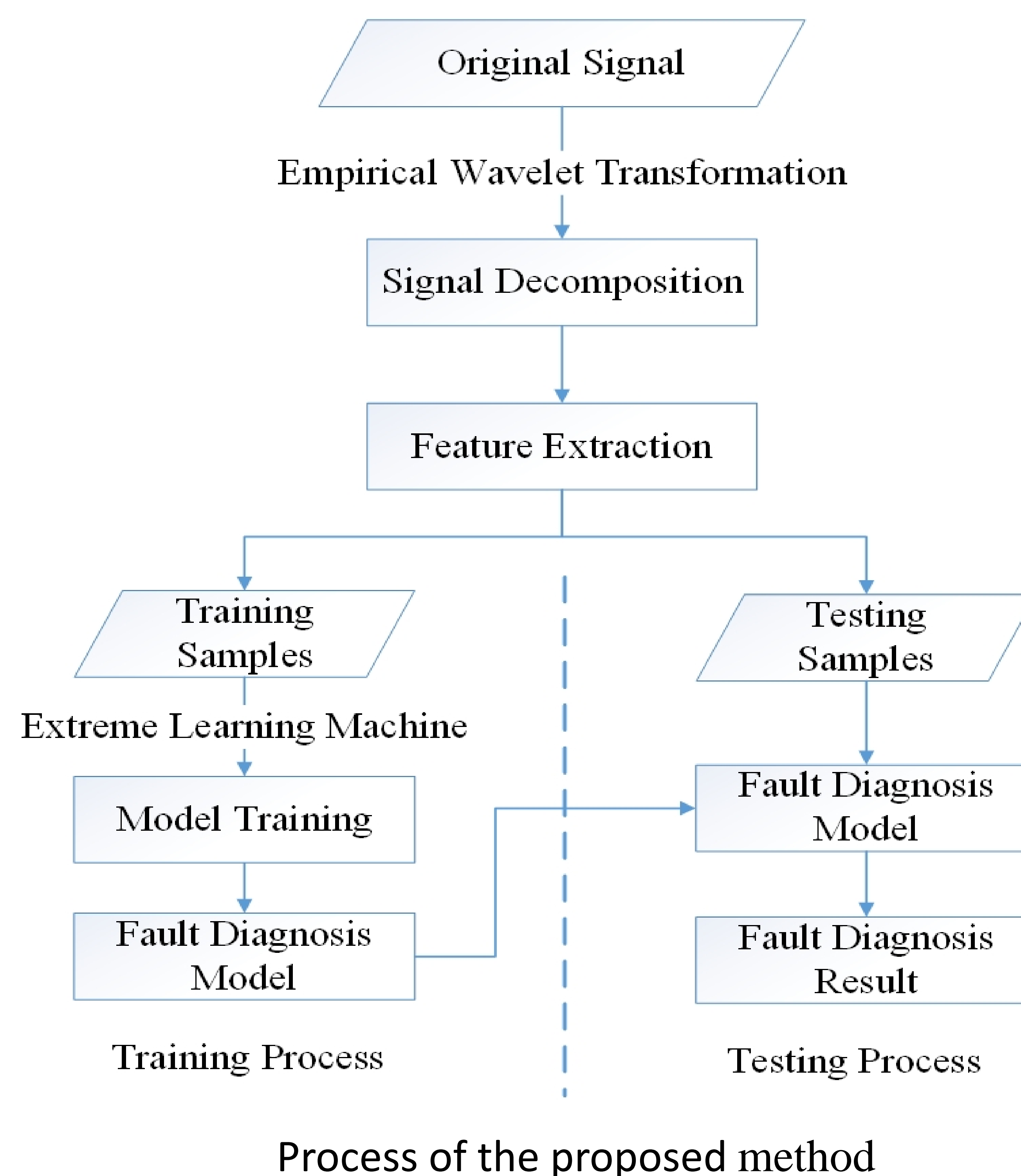
Research Details



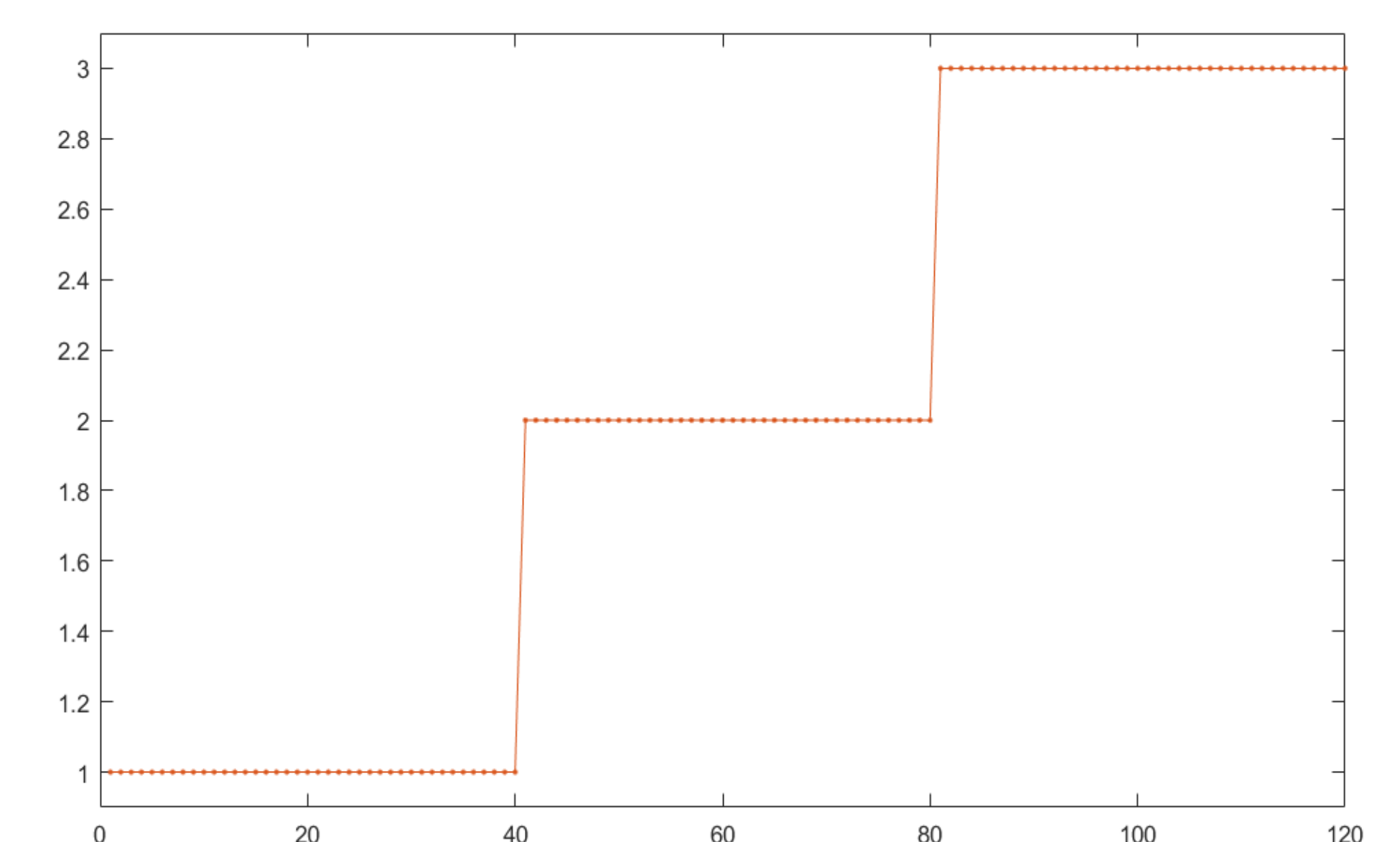
Experimental test plunger pump rig



EWT result of fault state



The actual state of the pump



The testing result

Acknowledgments and References

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