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SUAI State University of Aerospace Instrumentation

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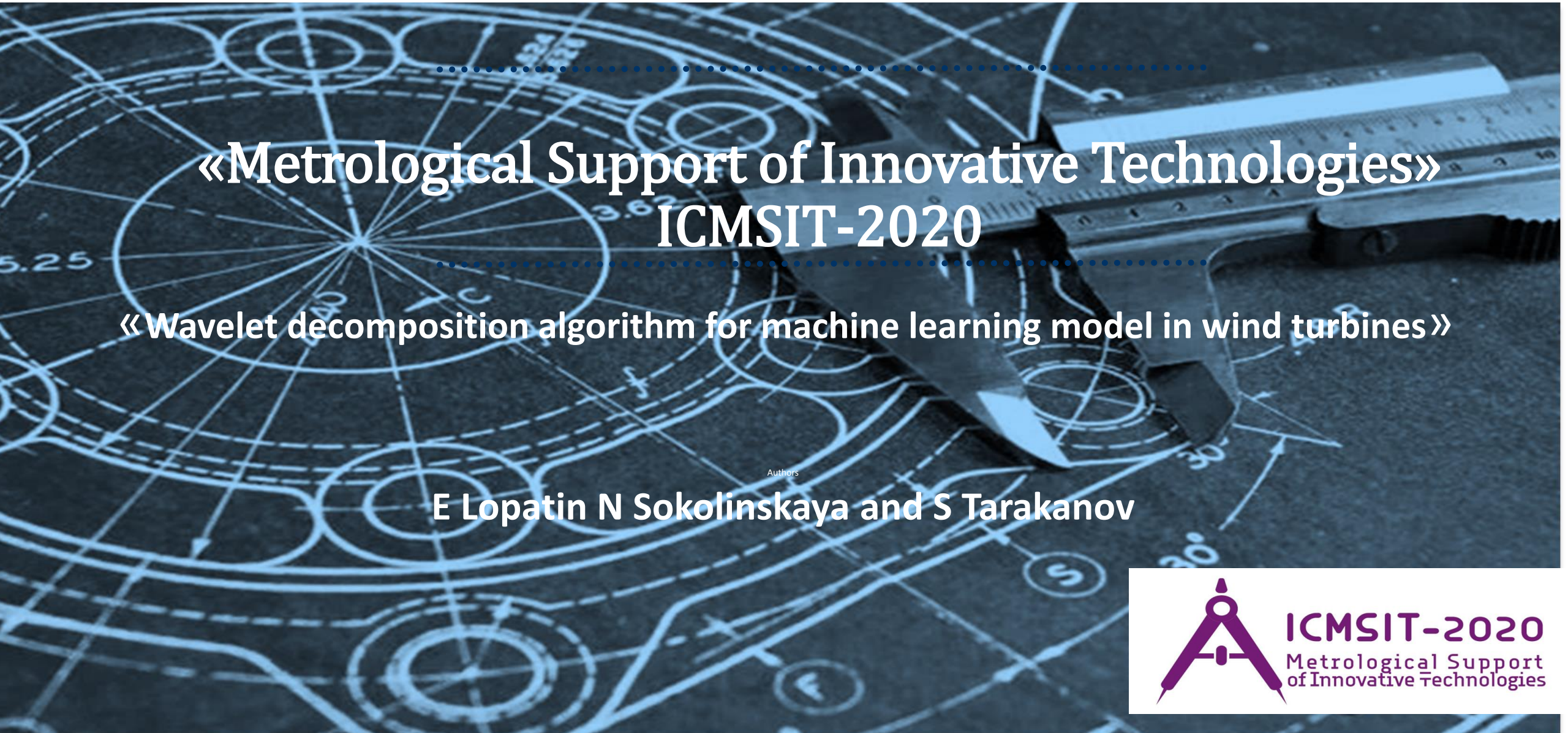

«Metrological Support of Innovative Technologies» ICMSIT-2020

«Wavelet decomposition algorithm for machine learning model in wind turbines»

Authors

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Problem statement

It is based on methods for analyzing the wind energy turbine vibration spectrum and the envelope spectrum of a high-frequency total vibration. However, these methods have several disadvantages, namely:

1) most complete kinematic diagram of the equipment with a decree low exact parameters of its elements;

2) reliability of the diagnosis is directly related to the accuracy of determining the frequency rotational frequencies of the rotor (impeller);

3) parameters of some items of equipment, for example, bearings values can change during long-term operation or when changing the mode equipment operation, which reduces the reliability of the diagnostic model [6,7].

Solution methods

Dataset / Parameters	Frequency							
	f1		f2		f3		f4	
	TPR	PPV	TPR	PPV	TPR	PPV	TPR	PPV
High Speed Gearbox Dataset (G)	0,589	0,786	0,923	1	0,706	0,733	0,804	0,945
High Speed Bearing Dataset (G)	1	1	0,951	1	0,782	0,932	0,742	1
Bearing 6213 OR Dataset (B)	0,921	0,960	1	1	0,897	1	0,950	1
Bearing 6213 Norm/OR Dataset (B)	0,821	0,92	1	1	0,865	1	0,756	0,982

Conclusions

Results, implementation

The best classification results for vibrational signals were obtained with using the polynomial core of MOV. Moreover, for feature space classification accuracy on average has a value close to unity: ACC = 0.964; TPR = 1; TNR = 0.974. This position was proved in researches about energy market [20, 21, 22].

The best attribute space, providing on average the highest the classification accuracy for various types of nuclear functions of the MOM is feature space No. 4 (BFS-C- I + BFS-C- II). On average, the accuracy of the classification based on ACC = 0.919.

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