# Computationally Efficient Rotational Speed Estimation of Synchronous Generator Based on Stator Voltage Measurement

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## Abstract

Estimation of the parameters of a synchronous generator mathematical model, is usually based on the waveforms measured directly on the generating unit [1]. These waveforms are recorded during a carefully chosen disturbance test of the machine. The deviation of the generator rotational speed is one of the quantities necessary for determining the parameters of the generator [5]. However, it is very difficult to make a direct measurement of this quantity [5]. A rotational speed estimation based on a generator's stator voltage is an alternative solution to the problem. The aim of the paper is to find a computationally efficient and accurate method for estimating the rotational speed changes (frequency changes) of a synchronous generator based on the recording of its stator voltage during the disturbance test. There are numbers of available algorithms dedicated to solve this problem [2, 3, 4]. The algorithms examined in the paper are based on Prony's estimator, zero crossing detection, LMS fitting and layer recurrent neural networks. Paper contains literature survey, analysis of the recorded stator voltage, description of the selected algorithms and tests performed using signals with know frequency variation as well as tests performed using waveforms recorded in a power plant on a working generating unit. Performed algorithms evaluation allows to choose the best solution in terms of accuracy and computational efficiency.

## References

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