

## عنوان مقاله:

Improvement of Turbine Inertia Compensation in Wind Turbine Emulators using Kalman Filter

## محل انتشار:

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## نویسندگان:

Mansour Rafiee - Faculty of Electrical Engineering, Shahid Beheshti University, Tehran, Iran

Mahdi Pourgholi - Faculty of Electrical Engineering, Shahid Beheshti University, Tehran, Iran

Afshin Shahmohammadi - Faculty of Electrical Engineering, Shahid Beheshti University, Tehran, Iran

## خلاصه مقاله:

In this paper, a ۳.۱kW DC motor is used to simulate the static and dynamic behavior of a horizontal axis wind turbine. The effect of the difference between the wind turbine's inertia and DC motor on the dynamic behavior of the system, torque oscillation due to the effect of the tower shadow and wind shear, and the effect of rotary losses in the mechanical torque of the DC motor are considered. The torque of the DC motor is controlled by the closed-loop PID controller. This closed loop has two feedbacks for the speed and current of the DC motor. The turbine calculations are performed in Matlab/Simulink and the reference signal of the turbine's torque is sent to the chopper using an interface card. Two methods are proposed to estimate the acceleration of the DC motor to improve the compensation of the turbine inertia effect: the Kalman Filter, and the second-order low-pass filter. Adjustable parameters of proposed methods are optimized using the particle swarm optimization algorithm (PSO). A ۲.۲ kW synchronous generator is coupled with the wind turbine emulator and feeds a constant load. To show the effectiveness of the proposed methods the results are reported. The results indicate that the Kalman filter has a better performance in the compensation of the turbine inertia effect.

## کلمات کلیدی:

Wind turbine emulator, Horizontal axis wind turbine, Wind turbine inertia compensation, Tower shadow effect, Real time simulation, Kalman Filter, PSO algorithm

## لینک ثابت مقاله در پایگاه سیویلیکا:

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