**Blade pitch angle control of a wind turbine with PI, PID, GA-PID and BA-PID controllers.**

***Goksu GÖREL1,\*, Ismail MOHAMED SOUGUEH2***

*1* *Instıtute of Scıences., Faculty of Engineering, Electrical and Electronics Engineering, Çankırı Karatekı̇n Unıversıty, Çankırı, Turkey*

*2* *Instıtute of Scıences., Faculty of Engineering, Electrical and Electronics Engineering, Çankırı Karatekı̇n Unıversıty, Çankırı, Turkey*

|  |
| --- |
|  **Abstract**Today, the share of renewable energy sources in the energy market is on the rise. The most important of these sources is wind energy. Depending on the wind speed, wind turbine speed control is an important control parameter. This speed parameter should be kept under control in order not to damage the turbine and other important parts at high wind speeds. In this thesis, modelling is done to control the pitch angle of a wind turbine with PI (Proportional Integral), PID (Proportional Integral Derivative), GA-PID (Genetic Algorithm-Proportional Integral Derivative), and BA-PID (Bacterial Algorithm-Proportional Integral Derivative) controllers. PI, PID, GA-PID, and BA-PID controllers are used to prevent damage to the power system at high wind speeds and to keep the effect of variable wind speeds on the output power within acceptable limits. It is aimed at keeping the output power constant. The wind turbine was modelled as a simulation in the Matlab/Simulink program. In this study, the output power point (500 KW) is kept at a more optimum level by applying the GA-PID and BA-PID controllers. |
| Keywords: Wind turbine, Genetic algorithm, Bacterial algorithm, Optimization |

**References**

1. Saad, N.H., El-Sattar, A.A., & Marei, M.E. (2018). Improved bacterial foraging optimization for grid connected wind energy conversion system based PMSG with matrix converter. *Ain Shams Engineering Journal*, 9, 2183-2193.
2. Grady, S.A., Hussaini, M.Y., & Abdullah, M.M. (2005). Placement of wind turbines using genetic algorithms. *Renewable Energy*, 30, 259–270.
3. Tong, W. (2010). *Wind power generation and wind turbine design*. WIT Press publishes leading books in Science and Technology, 769 pages.
4. Leithead, W.E., & Connor, B. (2000). Control of variable speed wind turbines: Dynamic models. *International Journal of Control*, 73, 1173-1188.
5. Kim, Y.S., Chung, I.Y., & Moon, S.I. (2015). Tuning of the PI controller parameters of a PMSG wind turbine to improve control performance under various wind speeds. *Energies 2015*, 8, 1406-1425.