

Modelling of PMSG Based Wind Power Generation

Madhuri Gangaram Bhoir¹, Shridhar Khule², Somanath Hadpe³, V. R. Aranke⁴, Pankaj Kumar⁵

P.G. Student, Electrical Department, Theem College of Engineering, Boisar, India ¹

H.O.D, Electrical Department, Matoshri College of Engineering & Research Centre, Nashik, India ²

P.G. Coordinator, Electrical Dept., Matoshri College of Engineering & Research Centre, Nashik, India ³

Assistant Professor, Electrical Dept., Matoshri College of Engineering & Research Centre, Nashik, India ⁴

Assistant Professor, Electrical Department, Theem College of Engineering, Boisar, India ⁵

Abstract: *This work grants a general modelling and simulation outline for wind control generation structures based on Permanent Magnet Synchronous Generators (PMSG). The model integrates wind turbine aerodynamics, mechanical drive train dynamics, and detailed electrical modelling of the PMSG in the d-q reference frame. It also includes the implementation of power electronic converters and control strategies such as Maximum Power Point Tracking (MPPT) and vector control for efficient energy extraction and grid integration. Developed in a simulation environment, the model supports performance analysis, control development, and system optimization under variable wind conditions, making it a valuable tool for both academic research and industrial applications..*

Keywords: Wind turbine, PMSG, WECS, MPPT, Power Converter, Drive Train Dynamics

