



# AIUB DSpace Publication Details

**Title:** Design and Analysis of a Virtual Synchronous Generator Control Scheme to Augment FRT Capability of PMSG-Based Wind Turbine

---

**Author(s) Name:** Heera Jahan Prema, Md. Rifat Hazari<sup>1</sup>, Mohammad Abdul Mannan, Md. Abdur Rahman

---

**Contact Email(s):** [mdmannan@aiub.edu](mailto:mdmannan@aiub.edu)

---

**Published Journal Name:** Advances in Science, Technology and Engineering Systems Journal

---

**Type of Publication:** Journal

---

**Volume:** 7 Issue 6

---

**Publisher:** ASTES Journal

---

**Publication Date:** December 2022

---

**ISSN:** 2415-6698

---

**DOI:** 10.25046/aj070626

---

**URL:** <https://www.astesj.com/v07/i06/p26/#1466873450304-13255c53-ec91>

---

**Other Related Info.:** Page 236-243

---

**Citation:** Heera Jahan Prema, Md. Rifat Hazari<sup>1</sup>, Mohammad Abdul Mannan, Md. Abdur Rahman, “Design and Analysis of a Virtual Synchronous Generator Control Scheme to Augment FRT Capability of PMSG-Based Wind Turbine,” Advances in



## AIUB DSpace Publication Details

Science, Technology and Engineering Systems Journal, Vol. 7, No. 6, pp. 236-243, December 2022.

### **Abstract:**

Massive integration of inverter dominated renewable energy systems (RESs), i.e., wind turbines (WTs), reduces the reliance on conventional alternator-based power stations. The system inertia and damping aspects of the power system were significantly decreased by this extensive integration of inverter-based WT system, which impacts on the fault ride-through (FRT) competence and thus precipitates the frequency instability. Modern grid code instructed to operate the WT system similar like conventional power plants. However, most of the conventional inverter controller failed to fulfil the requirement. To compensate for the issues, an advanced control method of a VSG for variable speed wind turbines with a permanent magnet synchronous generator (VSWT-PMSG) is proposed by this work. The proposed control scheme mimics the behavior of a conventional alternator and includes an active-power frequency control scheme with a governor model accompanied by an automatic voltage regulator (AVR) model, along with a current feedback loop system which enhance the system inertia and consider damping aspects of the system during serious fault conditions, i.e., three line to ground (3LG) fault. The suggested VSG-based inverter controller's functionality has been verified using the simulation model.

### **Keywords:**

Wind Farm, Permanent Magnet Synchronous Generator, Virtual Synchronous Generator, Fault Ride-Through