Power optimization for a variable-speed stall-regulated wind-turbine using scalar control

Abstract :

This paper presents the power optimization for a stall-regulated wind turbine with a variable-speed concept, using scalar control approach. To optimize the power under low wind speed velocity, speed regulation was adapted. In this regulation, speed needs to be controlled at the optimum points by keeping the power coefficient at the peak curve and by maintaining the tip speed ratio at optimal value. To achieve this, the conventional method of closed-loop scalar control was developed and then compared with the cascade-loop scalar control. The complete proposed system was developed by using Matlab/Simulink Software. The results showed that both scalar control methods could regulate the speeds, hence able to optimize the power at each wind speed under low wind speed velocity. However, cascade-loop scalar control method performed a better result compared to the conventional one.