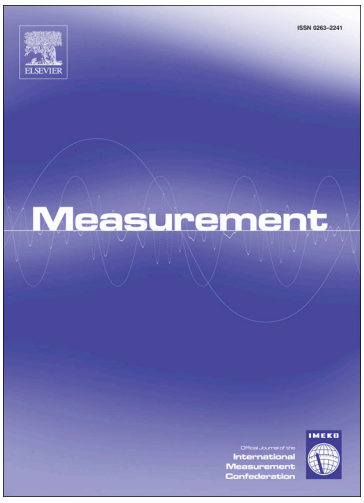

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Condition Monitoring of Wind Turbine Pitch Controller: A Maintenance Approach

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Abstract

With the increase of wind power capacity worldwide, researchers are focusing their attention on the operation and maintenance of wind turbines. A proper pitch controller must be designed to extend the life cycle of a wind turbine's blades and tower. The pitch control system has two main, but conflicting, objectives: to maximize the wind energy captured and converted into electrical energy and to minimize fatigue and mechanical load. Four metrics have been proposed to balance these two objectives. Also, diverse pitch controller strategies are proposed in this paper to evaluate these objectives. This paper proposes a novel metrics approach to achieve the conflicting objectives with a maintenance focus. It uses a 100 kW wind turbine as a case study to simulate the proposed pitch control strategies and evaluate with the metrics proposed. The results are showed in two tables due to two different wind models are used.

1. Introduction

1.1. Wind energy increasing

Renewable energy is growing fast in the world todaybecoming increasingly common, with wind turbines (WT) one of the most popular energy sources. Wind power capacity is increasing exponentially every year around the world; Figure 1 shows the massive increase over the last 40 years.

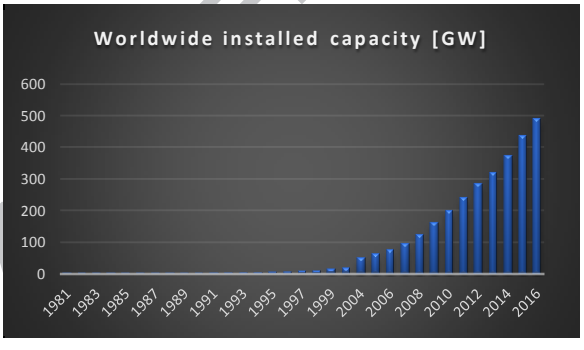
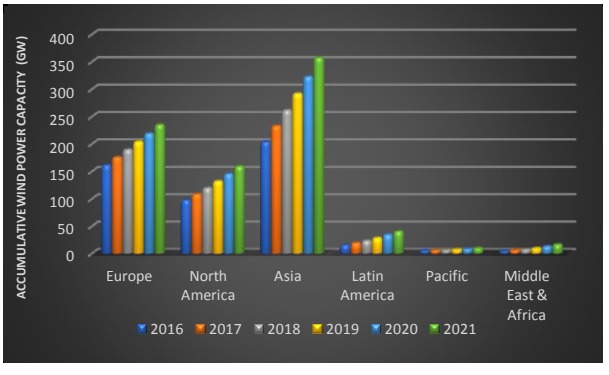


Fig. 1. Accumulative wind power capacity since 1981 (source: GWEC).

According to World Wind Energy Association (WWEA), worldwide wind capacity will reach 540 gigawatts by the end of 2017. The Global Wind Energy Council (GWEC) says the confidence in the wind power market will continue, as the technology is improving, prices are going down, and WTs have a positive impact on climate change by reducing emissions. Figure 2 shows GWEC's forecast of wind power capacity by region between 2017 and 2021.



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