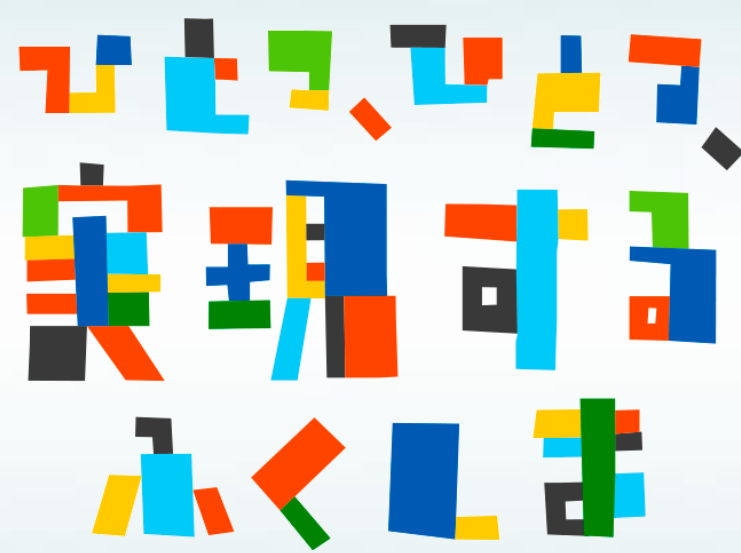
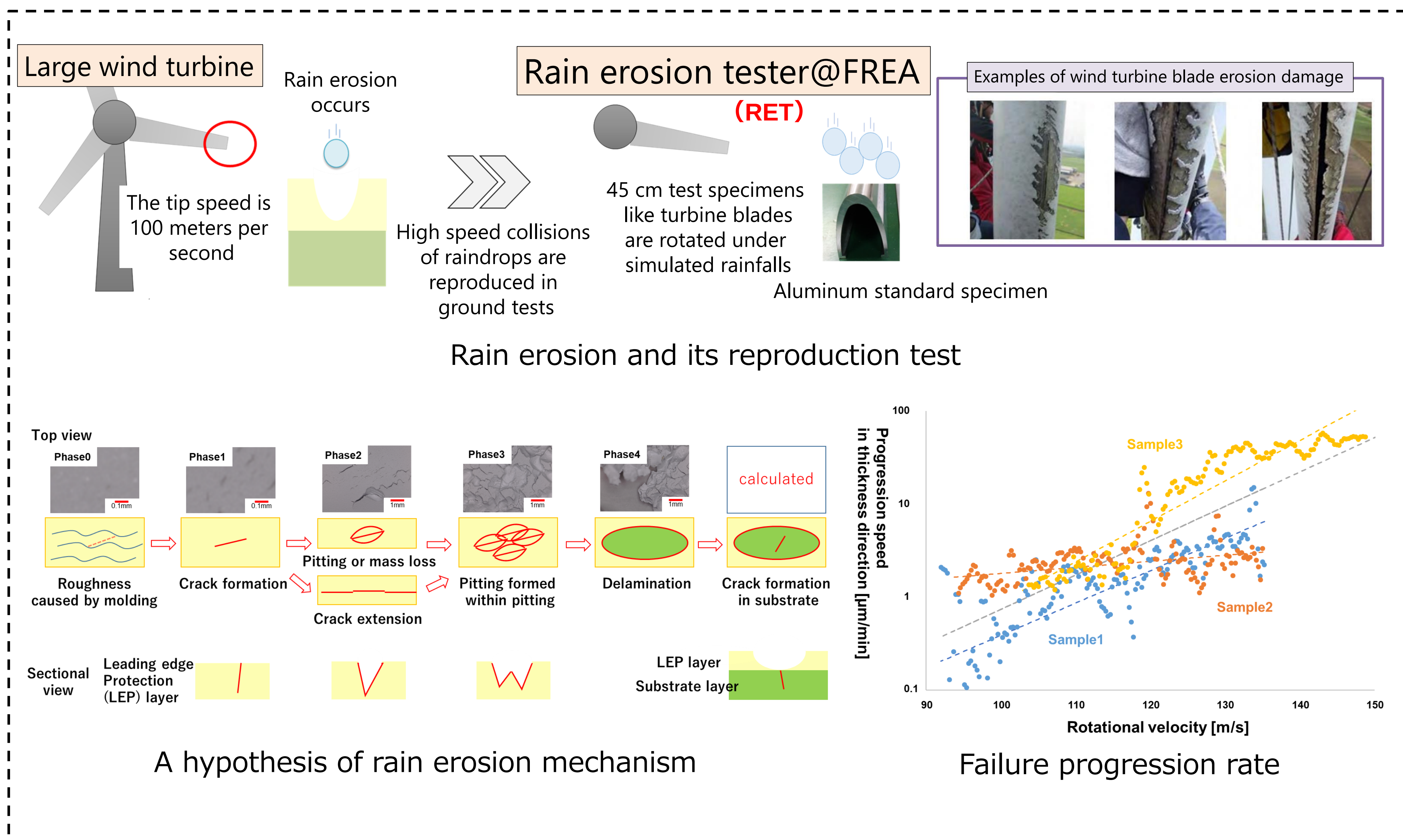




Development of Technology to Evaluate Erosion of Wind Turbine Blades

Research period : 2022-2024



Background · Purpose

Wind turbine blade components are exposed to sunlight, lightning, and rain, resulting in the occurrence of various defects. "Rain erosion", leading edge surface erosion has become a significant issue in recent years. This occurs when the rapidly rotating blade collides with raindrops, causing surface abrasion, which can lead to reduced power generation performance and even breakage. However, the mechanism of this failure is unknown, and there are no appropriate evaluation methods based on an understanding of the phenomenon. In this work, we aim to clarify the mechanism of failure and establish a test method to evaluate durability in a short period of time.

Research Contents

We formed a hypothesis of the mechanism of failure, based on the observation results of rain erosion reproduced by a rain erosion tester owned by the National Institute of Advanced Industrial Science and Technology (FREA). Also, we obtained roughness parameters and estimated the failure progression rate and lifetime from these parameters. In addition, we calculated the extent to which rain erosion is accelerated by ultraviolet rays.

Summary

We clarified the mechanism of rain erosion, estimated the rate at which the damage progressed in the film thickness direction, and evaluated the lifetime of the blade, including the effect of ultraviolet rays. As a result, we were able to establish a method for evaluating the durability of components in a short period of time.