

Aiming for More Efficient Wind Power Generation

We conducted research to make more efficient wind turbines using a Savonius windmill design. Propeller-type windmills, which are the main devices for wind power generation at present, are not suitable for power generation in Japan, where there are many mountain areas and constant wind does not blow. Past research about Savonius windmills reported that the power generation efficiency increased or decreased by installing parallel plates (a shield) on the wind turbine. To investigate the efficiency of this design, we measured the amount of power generation by changing the relative position of the Savonius windmill and the shield on its backside (moving by 5 cm from the origin, until a maximum distance of 55 cm), the installation angle of the shield (from -50 degrees to 50 degrees), and the wind speed (from 1.5 m/s to 4.0 m/s). Efficiency was at its maximum with a shield distance of 55 cm and a shield angle of 0 degrees. For wind speed, at 2.0 m/s or lower, the power generation efficiency was greater when the shield was installed on the back side of the convex surface and parallel to the rotation direction. Under these conditions, a Savonius windmill may be a better alternative to conventional windmills. Shield length affects efficiency, however, so different shield lengths should be explored in future experiments. More mathematical analysis is also needed for the wind speed results.