The model wind turbine is a two-bladed downwind horizontal axis wind turbine with the rotor diameter of *D* = 1.6 m and the hub height is 1.535m as seen in Fig. 6.1 (a). The rotor rotational speed is adjusted by a variable speed generator with the maximum of 1200 rpm. In this study, the rated rotational speed is set at 880 rpm and the mainstream wind velocity is 10 m/s. The blade is an Avistar airfoil. Fig. 6.1 (b) shows thrust force *T*, pitching moment *MX* and yawing moment *MZ* on the test wind turbine. The thrust force *T* is a component in the direction of the rotation axis of the force acting on the rotor surface.

The pitch angle is controlled by a swash plate connected to the pitch lever. The swash plate consists of two discs, a non-rotating part and a rotating part, via a bearing. When the swash plate is moved parallel to the rotor surface, the pitch angle does not change with respect to the azimuth angle. As a result, the steady pitch control can be performed. When the swash plate is in tilted movement with respect to the rotor surface, the distance between the rotor surface and the outer edge of the rotating part of the swash plate varies depending on the azimuth angle position.

The pitch angle change in the cyclic pitch control is given by the following expression:



Here, *ψ* is the azimuth angle, *ξ* is the phase angle of the pitch angle *θ* with respect to the azimuth angle *ψ*, *a* is the pitch angle amplitude, and *b* is the average pitch angle.

