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Aerodynamic Devices Development for Model Aircraft Control and Wind-Driven Bicycle

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Abstract : Several aerodynamic devices currently attract engineers and research students. The plasma actuator is one of them, and it is very effective to control the flow. The actuator recovers a separated flow to an attached one. The actuator is also inversely applied to a spoiler. The model aircraft might be controlled by this actuator. We develop a model aircraft with the plasma actuator. Another interesting device is the Wells turbine which rotates in one direction. The present authors propose a bicycle with the Wells turbine in the wheels. Power reduction is measured when the turbine is driven by an electric motor at the exit of a wind tunnel. Several Watts power reduction might be possible. This means that the torque of the bike can be augmented by the turbine in the cross wind. These devices are tested in the wind tunnel with a three-component balance and the aerodynamic forces and moment are obtained. In this paper, we introduce these devices and their aerodynamic characteristics. The control force and moment of the plasma actuator are clarified and the power reduction of the bicycle is quantified.

Keywords : aerodynamics, model aircraft, plasma actuator, Wells turbine
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