

RESEARCH ON THE TECHNIQUE OF ICE SHAPE MEASUREMENT BASED ON LASER SHEET AND MACHINE VISION IN WIND TUNNEL

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For the sake of developing an ice shape profilometer in icing wind tunnel, the technique of ice shape measurement based on laser sheet and machine vision is studied in this paper. The measure principle and computing theory have been demonstrated in detail. The instrument projects a thin sheet of laser light onto an ice shape and uses high resolution CCD cameras to detect the light scattered by the ice. According to the camera calibration results, the instrument corrects the camera images through the step of image processing, calculates and reconstructs the stereo profile, displays an outline of the ice shape on the computer screen. The primary accomplished tasks have been pointed out in this paper. The system measurement results of length, angle, radius and ice shape have been brought out. The instrument has undergone extensive testing through measuring several kinds of objects. Results of test shows very good agreement between the measurement value and the gauge. With the technique, the thickness and shape of ice accretions on the leading edge of airfoils and other models in wind tunnels can be real-time measured.