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Aerodynamic analysis of a Bladeless Fan

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Sponsor: Midea

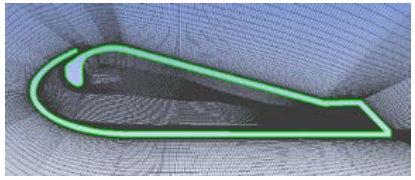
Project Description

- Characterize the aerodynamic performance of bladeless fans
- Develop strategies to reduce noise of a high-speed bladeless fan system.

Midea blaldeless fan

Approach

- Develop CFD models of a baseline bladeless fan to evaluate its aerodynamic performance.
- Measure the air velocity in the air inlet and far field by using 3D ultrasonic anemometer.



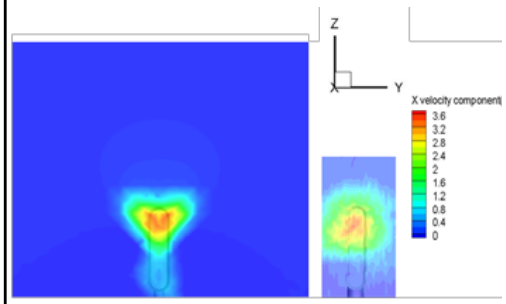
CFD mesh of fan's cross section

Measurement set-up

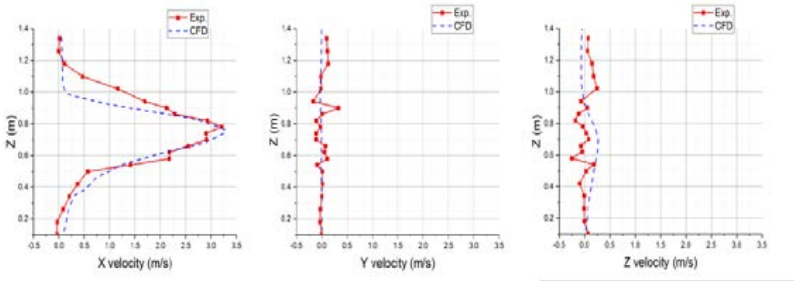
Discussion

- Influence zone is located at the top of the fan at far field.
- Aerodynamic performance of the baseline bladeless fan is sensitive to geometric details (airfoil, slit width, structure details) of the wind channels.

Results



Streamwise velocity @x=1.5m



Detailed comparison of u_x, u_y, and u_z profiles at x=1.5m

The aerodynamic performance of bladeless fan is dominantly determined by the geometry of wind channel.

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