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Effect of Seam Position on the Aerodynamic Performance of Winter Sportswear Fabrics

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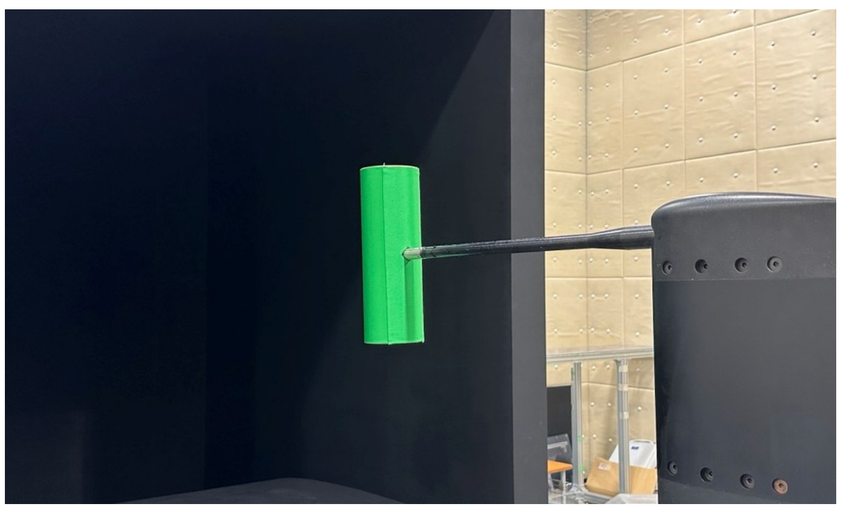
INTRODUCTION & AIM

This study aims to investigate the aerodynamic properties of fabrics used in winter sportswear, with a specific focus on the effect of seam placement on air resistance. To achieve this, wind tunnel experiments were conducted using two different models: a cylindrical model and an airfoil-shaped model. The experiments were designed to simulate real-world conditions encountered in high-speed winter sports and to analyze how changes in seam position affect aerodynamic performance.

METHOD

Using a sports-specific wind tunnel, two models (airfoil-shaped and cylindrical) were tested to analyze and compare changes in air resistance due to different seam positions(Figure 1).



Cylinder test

Airfoil-shape test

Figure 1. Experimental setups for wind tunnel experiment

RESULTS & DISCUSSION

For the cylindrical model, the seam was tested at various angular positions. The results showed that placing the seam at 30 degrees from the front-facing direction yielded the lowest drag coefficient (Cd = 0.63) at a wind speed of 100 km/h. This represents a 25% reduction in air resistance compared to a seam positioned at the very front (0 degrees, Cd = 0.84). This suggests that seam placement away from the stagnation point can significantly reduce drag in cylindrical shapes.

In contrast, the airfoil-shaped model exhibited the lowest drag when the seam was located directly at 0 degrees, indicating that aligning the seam with the airflow direction is most effective for this geometry.

CONCLUSION

These findings demonstrate that seam location plays a critical role in the aerodynamic efficiency of winter sportswear. Depending on the shape of the body or equipment, optimal seam positioning can vary. Understanding these dynamics allows for better design strategies aimed at minimizing drag and improving athlete performance in high-speed winter sports environments.

FUTURE WORK / REFERENCES

Asai et al. Flow visualisation of downhill skiers using the lattice Boltzmann method, Eur. J. Phys. 38 024002 (2017)