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The efficiency of modern transportation is severely compromised by the prevalence of turbulent drag. The high level of turbulent skin-friction occurring on aircraft surface is responsible for excess fuel consumption and increased carbon emissions. The environmental, political, and economic pressure to improve fuel efficiency and reduce carbon emissions associated with transportation means that reducing turbulent skin-friction drag is a pressing engineering problem.

Carbon nano-tubes or graphene can become super-hydrophobic by suitable surface treatment while potentially nano-structured carbon can also thermally activate the coating using the plane's on-board electrical system. Wind tunnel tests, in combination with fluid dynamics modelling, will be conducted to optimise the application methods and the effect of different substrates, icing fluids, contaminants etc., thus correlating the aerodynamic and de-icing behaviour to the morphology of the material.

The aim of this project is to use Open-source software to model aerodynamic performance (drag reduction) of nano-structured top coating material, based on outputs of the wind tunnel testing. The project involves identification the suitable open-source CFD software, and then development of CFD code to model drag reduction of nano-structured top coatings for aircraft.

This project will suit Engineering, graduate who is interested in computational modelling. Some experience in CFD is essential.

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