Analyzing the Impact of Drafting in Cross Country Skiing with Computational Fluid Dynamics

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The purpose of this study was to determine the optimal drafting formations for reducing the aerodynamic drag experienced by a group of cross country skiers. Previous studies on cycling and running have quantified the impact of drafting in their respective sports, with as high as a 96 % reduction in cycling and a 57% reduction in running. While cross country skiing occurs at speeds between that of cycling and running, there is also greater distance between athletes. To analyze the influence of these different factors, this study developed a 3D model of a cross country skier, conducting a Computational Fluid Dynamics investigation using Solidworks Flow Simulation software. Seven different formations from different endurance sports were compared at a speed of 8 m/s. The results indicated a drag reduction to as low as 43% compared to the forces experienced by an isolated skier, and an average reduction to 57% for the entire group of skiers. The study determined linear patterns were most effective in reducing the mean drag experienced by a group of skiers, though further research is needed to corroborate the results of the CFD simulations with wind tunnel and real world data

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