Computational fluid dynamics for the nordic combined skiing jump

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Abstract

The Nordic Combined is a winter sport which athletes compete in two specific and very different disciplines: the cross-country skiing and the ski jumping. In this study, we focus on the ski jumping and more specifically on the take-off and the stable flight phases of the high level of athlete’s behaviors. This production is performed in partnership with the French team of the Nordic Combined. The aim of our paper is to develop combined methodologies between the experimental data approaching from the kinematical Vicon system and those from the CFD (Computational Fluid Dynamics) methods. The simulation of the body movement will permit to understand and improve the posture of the skier during jumps in addition to distribution of the air pressure on the body of the skier. This will allow to develop and design a specific and dedicated form of underwear.

The aim of this study is to present a robust 3D methodology capable of improving the skier jump. The developed model can be used with specific three-dimensional athlete data in two ways: 1) the aerodynamic behavior of the skier in the stable flight phase (study of the aerodynamic drag) and 2) the air pressure influence on the skier. In order to design the specific and dedicated underwear.

Keywords: Computational fluid dynamics, ski jumping, methodology, virtual wind tunnel