Tribological investigations in cold environment for winter sports applications: comparative ice friction measurements in different test rigs

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Abstract

The general aim of the ongoing project is to develop a methodology for evaluating snow and ice friction on a laboratory scale, which enables reliable transferability to large-scale component tests and real applications. In this work, the special case of steel runners in contact with ice is investigated. The goal is to optimize the friction between ice and steel runners by using different surface topographies and/or surface treatments.

Due to the sensitive nature of ice in terms of environmental and contact conditions, the friction mechanisms involved cannot be easily determined. Therefore, the interpretation of the results is very demanding. By performing comparative measurements with different test setups, a broader framework for the analysis of the ice friction mechanisms can be created.

In the present study, ice friction measurements were carried out using steel samples with different surface topographies and/or surface treatments. Tests were conducted on three different test setups and compared: an oscillating tribometer by measuring the coefficient of friction, an inclined ice plane by measuring the sliding velocity of the steel samples and in a real system by measuring the velocity of a skeleton slide.

Keywords: ice friction, steel runners, winter sports, liquid-like layer, friction regimes

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