Surface Modification Inspired by *Malayopython Reticulatus* for Friction Control

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This research is to study the frictional characteristics of a real *Malayopython Reticulatus* snake ventral scales and to evaluate its feasibility as an inspiration for surface modification designs. Two types of experiments were carried out at different sliding directions and surfaces to analyze the frictional characteristics of snake ventral scales. From this study, snakeskin demonstrates frictional anisotropy and it is prominent under wet condition. Based on these findings, surface designs inspired by snakeskin is suitable for parts or components that are subjected to directional friction especially in wet conditions.

Keywords : tribology, snakeskin, surface texturing, friction

1. Introduction

Surface texturing is a surface modification technique that is applied to improve surface tribological performance. The micro ornamentation on snakes ventral scales could be an inspiration in surface design. The lack of limbs on snakes enables its ventral scales to be in almost constant contact with the substrate, it is also able to occupy most types of niches [1-2]. This study aims to analyze the frictional properties of snake ventral scales and how it could be applied for friction control and wear reduction.

2. Methods

In order to analyze the frictional characteristics of the snake ventral scales, two types of experiments were carried out, the sliding on an inclined plane experiment and the tactile sliding using a force transducer experiment. To study the frictional anisotropy of the snake ventral scales, three types of sliding directions with regard to the scale's microstructures were analyzed.

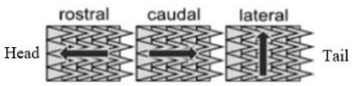

Fig.1 Three sliding directions used in the experiment with regards to the microstructures.

2.1. Inclined plane experiment

The aim for this experiment was to study the static coefficient of friction (COF) between the different sliding directions of the snake ventral scale sample with different types of surfaces and different surface conditions.

2.2. Tactile sliding using a force transducer experiment

The snake scale sample was placed on a force transducer and force was applied using finger strokes. The force observed by the force transducer was observed.

3. Results and Discussions

This research studies the real ventral scale of a *Malayopython Reticulatus* snake. In order to further understand the practicality of surface designs that is inspired by snakeskin, we must replicate the snakeskin onto different materials and compare the difference in COF with a controlled surface. This is due to the fingertip being a softer surface which increases the frictional anisotropy of the snakeskin.

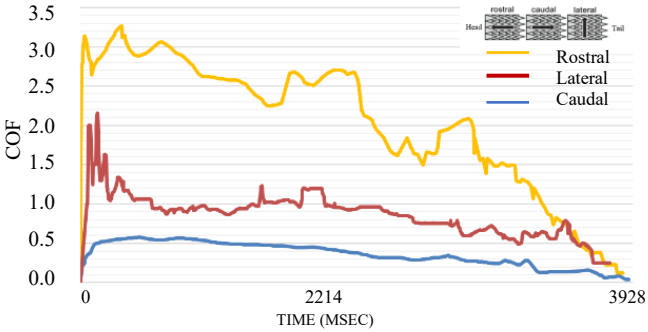

Fig.2 Average tactile COF against time of snake ventral scale for all sliding directions.

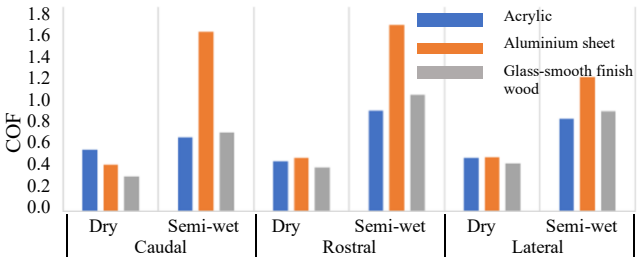

Fig.3 Average static COF of the snake ventral scale when sliding in three different directions on different materials and surface conditions.

4. Acknowledgements

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5. References

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