

Bionic Design and Anti-slip Characteristics Study of Quadruped Robot Foot



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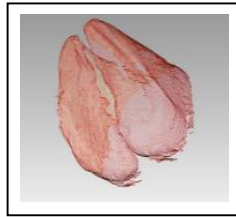


Introduction

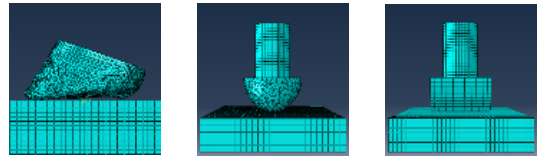
The foot structure is one of the important factors affecting quadruped robot's walking performance. The most important thing is that the anti-slip performance is largely determined by the foot structure, which plays a decisive role in the stable walking of the robot. Some animals have excellent anti-slip properties after a long-term evolution, it is meaningful to study and apply them to engineering.

Methods

3D scanner was used to obtain the point cloud data of goat foot. The ideal goat foot model was reconstructed in Geomagic Studio software.

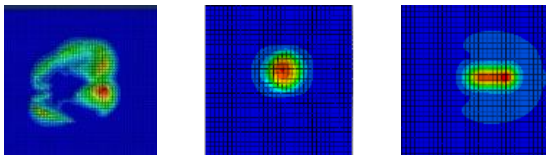


ABAQUS was used to find the maximum static friction of the bionic foot and normal feet under different pressure.

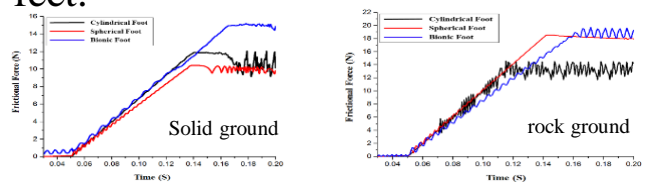


Results

The stress concentration positions of normal feet are in the middle part, while that of bionic foot is at the rear of the foot.



The normal feet started to slide more quickly than the bionic foot. And the maximum static friction of the bionic foot is larger than that of the normal feet.



Conclusions

1. The stress concentration of bionic foot is in the rear of the foot. This is because the hoofed animals are mainly supported by the heel, indicating that the bionic foot has biologically excellent characteristics.
2. The maximum static friction of the bionic foot under different pressures is the largest, indicating that the bionic foot has the best anti-slip ability on the soil and rocky ground.