

RESEARCH ON FRICTION CONTROL BY PILLAR-SHAPED TEXTURATION UNDER LUBRICATED CONDITIONS

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ABSTRACT

Mechanical components such as automotive wet clutches require high dynamic friction in the presence of lubricant. As a successful attempt in achieving that, Matsuo has improved friction of wet clutches by applying a pillar-shaped texture on steel plates ^[1]. However, the detailed mechanism of friction caused by the texture is still unrevealed. This study aims to understand why the pillar-shaped texture is effective in enhancing high friction performance.

We measured and calculated oil film thickness between sliding surfaces using a sliding tester equipped with a white light interferometer and computational fluid dynamics (CFD), respectively. Sliding tester was used for the measurement of friction coefficient between plane glass disc and textured steel ring surface. Fig. 1 shows texturation patterns for CFD.

The sliding tests and CFD results showed the differences in the film thickness between a flat surface and pillar-shaped textures. Fig. 2 shows oil film thickness, and Fig. 3 shows μ - V curves, measured simultaneously. Pillar-shaped textures formed thinner oil film than a flat surface, which is highly related to

high friction on the textures. The shape of pillar affects film thickness among the textures, which can be applied for controlling friction force. We will report further characteristics of pillar-shaped texture with some considerations.

REFERENCES

- [1] Matsuo, M., “Clutch texture technology inspired by two types of creatures. From conception to design to mass production method.” JSAE Symposium, 4-22, 2022, 26-2

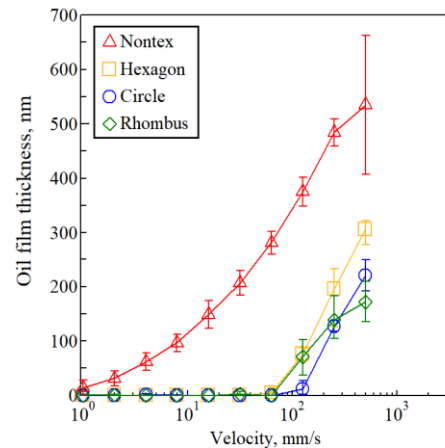


Fig. 2 Oil film thickness at 0.89 MPa, 40°C

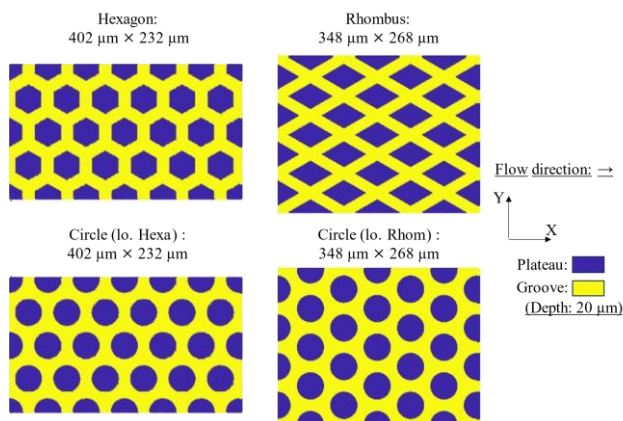


Fig. 1 Textures for CFD

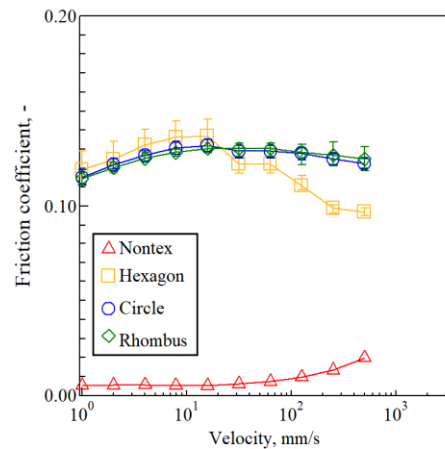


Fig. 3 μ - V curve at 0.89 MPa, 40°C