1. INTRODUCTION

It has well been recognized that the film shape formed in elastohydrodynamic point contacts has a plateau region at the central area and a constriction region at the exit area. During the last decade, the authors discovered several abnormal film shapes in high sliding conditions. In the current presentation, the author introduces the anomalous film shapes and mechanisms for generating the shapes on the basis of the rheology of the EHD film.

2. ANOMALOUS FILM SHAPES

Figure 1 shows the appearance of a dimple shape in the contact area in opposite sliding conditions [1]. It can be seen that a conical depression of film grows with increasing slide-to-ratio. This anomalous film shape can be explained by temperature distribution across the film, which is the viscosity wedge action.

Figure 2 shows the appearance of another anomalous film shape for various slide-to-roll ratios [2]. The lubricant for this test is 1-dodecanol, which is a fatty-alcohol. In the contact area, the temperature rise is small and thus not sufficient to generate the viscosity wedge action while the melting point is close to the ambient temperature. So, this anomalous film shape seems to be generated by solidification.

The mechanisms for generating the anomalous film shapes are totally different. One is a thermal effect and the other is solidification of lubricant. The common factor for these mechanisms, which leads to a conical depression of film in the central area is to decrease the Couette flow along the sliding direction.

REFERENCES