# EXPERIMENTAL AND SIMULATION ANALYSIS OF OIL-AIR TWO-PHASE FLOW CHARACTERISTICS IN HIGH-SPEED BEARINGS

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**ABSTRACT**

A new numerical calculation model is established for the oil-air two-phase flow in a complete bearing under oil jet lubrication. The Volume of Fluid (VOF) model is adopted to simulate the oil-air two-phase flow, in which the rotation and revolution of the balls is considered. The accuracy of the numerical calculation model is verified through a visualized experimental platform for oil distribution characteristics within the bearing cavity. The influence of oil temperature and different oil on the oil-air two-phase flow within the bearing cavity under different rotational speeds is analyzed. The variations in the oil distribution and oil volume fraction within the bearing cavity are obtained. The study reveals that under the action of the rotation and revolution of the balls, the wake flow is formed at the outer raceway. As the rotational speed increases, the wake flow disappears. More oil is distributed between the narrow end cage and the outer ring. The oil volume fraction is the largest in the outer ring and the smallest in the inner ring. At higher rotational speeds, as the oil temperature increases, the oil volume fraction in the inner ring, outer ring, and cage decreases. With the increase in rotational speed, the oil volume fraction in the gaps between the balls and the inner ring, as well as between the balls and the cage, decreases. This study provides theoretical support and guidance for the design of oil jet lubrication in high-speed bearings.