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篴齿封严泄漏特性的实验

Experiment on leakage characteristics in labyrinth seal

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中文关键词: [篴齿封严](#) [压比](#) [封严结构](#) [泄漏量](#) [压力分布](#)英文关键词: [labyrinth seal](#) [pressure ratio](#) [sealing geometry](#) [leakage rate](#) [pressure distribution](#)

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中文摘要:

为了研究工程实际尺寸下篴齿封严泄漏特性, 设计并搭建了篴齿封严实验台. 在进出口压比为1.1~2.0的条件下, 探究了节流间隙、齿数、齿腔深度和宽度等对篴齿封严泄漏量和密封腔内压力分布的影响. 结果表明: 泄漏系数随着压比和节流间隙的提高而增加, 但压比达到1.6后, 增加趋势逐渐变缓; 增加齿数能显著提高篴齿的封严性能, 但随着齿数变多, 效果逐渐减弱; 较浅和较宽的齿腔对于提高篴齿的封严性能更有利; 进出口压比、节流间隙和齿腔深度对于篴齿腔内压力系数的分布几乎没有影响; 篴齿腔内沿程压力不断降低, 但在各齿腔内降低的程度逐渐减小; 在篴齿封严中, 越接近入口的齿腔对密封性能提高的贡献越大, 对封严性能的优劣起着决定性作用.

英文摘要:

A labyrinth seal test setup with a data acquisition system was designed and established to investigate the leakage characteristics of a typical straight-through labyrinth seal with engineering size. The effects of sealing clearance, tooth number, cavity depth and cavity width on the leakage rate and chamber pressure distribution were measured at the pressure ratios with range of 1.1-2.0. Result shows that, the leakage coefficient increased with increasing pressure ratio and sealing clearance, but the increasing trend gradually slowed down when the pressure ratio reached 1.6. The leakage rate decreased rapidly as the tooth number increased. But the tooth number's effects on leakage rate decreased gradually with growing tooth number. The shallow and broad cavity was help to decrease the leakage rate. The decrease of the pressure coefficient became slower in the flow direction. The pressure ratio, sealing clearance and cavity depth had little effect on the cavity pressure coefficient distribution. The upstream cavities mode more contributions to reducing the leakage loss and had key effects on the labyrinth seal performance.

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