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微陀螺梳齿静电驱动力的计算方法

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摘　要：

准确计算静电力是分析微机械陀螺力学特性的关键。文章基于微陀螺静电驱动原理，介绍了微梳齿结构的静电场计算的无限大平板模型，边缘效应模型，拐角效应模型三种模型。推导了三种模型的电容计算公式和静电力计算公式。通过数值计算和有限元计算，得到交叠长度变化时，不同计算模型的电容和静电驱动力的对比和各种模型的适用范围。说明在微尺度条件下静电场的边缘效应和拐角效应应当在设计和计算梳齿时应当充分考虑。

关键词：微陀螺，边缘效应，拐角效应，数值计算，驱动力

THE CALCULATION METHOD OF THE ELECTROSTATIC DRIVE FORCE OF MICROMACHINED GYROSCOPE COMB

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Abstract:

To calculate the electrostatic force in the micro machined gyroscope is a key problem in the mechanical characteristic of it. Base on the principle of electrostatic drive of the micro machined gyroscope, the paper introduces infinite plane model, edge-effect model and corner-effect model as the electrostatic field computation module of the micro comb. It deduces the formula of capacitance computation and electrostatic force of three models. By the numerical calculation and finite element calculation, it gets the capacitance and the electrostatic force of the gyroscope and the applicable circumstance of each model that the overlap length in variation. It suggests that the edge-effect and the corner-effect of comb should be fully considered when designing and computing the comb.

Keywords: micro machined gyroscope;edge-effect;corner-effect;numerical calculation; drive force

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