



## 微小尺度射流流量传感器的设计与仿真分析

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摘要：

基于射流振荡原理设计了一种新型的无反馈通道微小尺度流量传感器，采用数值仿真软件FLUENT对该流量传感器的测量特性进行了模拟研究。通过观测振荡腔内部流场，定性分析了振荡器内部流动形态和射流振荡过程。通过对监测点流速变化曲线的分析，获得了不同入口速度下流体振荡频率，建立了流体流速与振荡频率的函数关系。仿真结果表明，该微小尺度射流振荡器振荡平稳，主射流切换灵活，在较宽的流速范围内，流速与振荡频率具有线性关系，可达到较低测量下限，并且易于加工成型。

关键词：流量传感器；射流振荡；计算流体力学；微小尺度；测量特性

## Design and simulation analysis of microscale

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**Abstract:**

A new type fluidic oscillator without feedback channel used as the flowrate sensor in microscale pipes is designed. The simulation study on some measurement characteristics of this flow sensor are conducted under the software FLUENT. The inner flow state and oscillating procedure in chamber is analyzed qualitatively through the investigation of flow fields. The oscillation frequency is obtained under different inlet velocities by the analysis of the velocity fluctuation in the preset points and then the functional relationship is established between the flow velocity and oscillation frequency. Simulation results show that the microscale fluidic flow sensor oscillates stably and the main jet switches side by side flexibly. The linear relationship between velocities and oscillation frequency can be obtained in relatively wide measurement range, and the sensor has the small lower measuring limitation and is easy to be fabricated.

**Keywords:** flowrate sensor; fluidic oscillation; computational fluid dynamics; micro-scale; measurement performance

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