面向角速度传感系统的微球腔实验研究

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摘　要：

微腔角速度传感系统是新一代光学传感器的代表。提出一种面向角速度传感系统的微球腔，其中微球腔作为核心部件直径约为1mm，根据测量及相关公式计算，半高全宽为10.5MHz，自由谱宽65.89GHz，Q值1.84*107，精细度为6.26*103。微球腔特有的高Q值、高分辨率、制备简单等性能，使其具有长远的发展前景。本文详细介绍了整个系统的工作原理，并通过使用不同波形、不同频率的扫频及调制信号进行实验，对比透射曲线和鉴频曲线的形态，获得在球腔系统中的最适参数。经验证，使用频率为10Hz的正弦波进行扫频，1MHz的三角波作为进行调制，能够使系统处于更优的状态。

关键词：光电子学；微球腔；锁频；扫频；调制

The experimental study of the microsphere cavity for the angular velocity sensor system

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Abstract:

The velocity sensor system which based on microcavity is a novel candidate for the next generation interial rotation sensor. For the angular velocity sensing system, the microsphere cavity is proposed. The key part of the system is the microsphere cavity, which diameter of 1mm. According to the measurement and related formula, the free spectral range of the resonator (FSR), the full width at half maximum of the resonance curve (FWHM), the value of Q and the fineness of the resonator (F) are 10.5MHz, 65.89GHz, 1.84*107, 6.26*103. The unique properties such as high-Q, high resolution, simple preparation and others make the microsphere cavity has a long-term development prospects. This paper describes the working principle of the whole system, we have used sweep signal and the modulated signal with different waveforms, different frequency to experiment, contrasted the shape of transmittance curves and frequency discriminator curve, and then acquired the most appropriate parameters in the system. After authentication, the system can be in a better state by using a 10Hz sine wave to be frequency sweeping signal and a 1MHz triangle wave to be modulation signal.

Keywords: optoelectronics; microsphere cavity; frequency locking; frequency sweeping; modulation

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