

两种典型扭振式粘度测头的灵敏度对比分析

作者: 孙培元, 赵美蓉, 马金玉

单位: 天津大学精密测试技术及仪器国家重点实验室

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摘要:

针对扭振式粘度测量中, 不同测头形状所受到的粘性力不同, 进而对测量灵敏度产生影响的问题, 基于FBG扭矩微振粘度测量原理, 研究柱形与球面两种测头装置的测量精度及灵敏度。通过对不同形状的测头建立数学模型, 得出相应的电压-粘度关系式, 在实验室环境下通过标定实验确定待定系数, 并比较两种测头的测量特性。实验数据表明, 柱形测头的测量精度及灵敏度高于球面测头, 验证了理论分析。同时, 对测量误差来源进行了分析, 为后续研究提供了理论基础。

关键词: 粘度测量; 灵敏度分析; 流体粘性力; 测头; 标定

The comparison analysis of two typical torsional vibration viscosity probe sensitivity

Author's Name:

Institution:

Abstract:

Aiming at the problems in torsional vibration viscosity measurement that sensitivity is influenced by different shapes of probe subjected to different viscous force, the measuring accuracy and sensitivity of cylindrical probe and spherical probe are studied according to the principle of viscosity measurement based on FBG micro-torsional vibration. Through the mathematical model built for different probes, corresponding voltage - viscosity formulas are derived, then in laboratory environment, the undetermined coefficient is got from calibration experiment, and the measuring characteristics are compared between the two probes. The experimental data shows that cylindrical probe is more accurate and more sensitive than spherical probe, which verifying the theoretical analysis. At the same time, we also analysis the measuring error sources to provide theoretical basis for the further study.

Keywords: viscosity measurement; sensitivity analysis; viscos force; probe; calibration

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