

Structural Influence on the Performance Based on Uncertainty Analysis for Coriolis Mass Flowmeter

D. Feng^{1,2*}, S. Fan^{1,2} and D. Zheng^{1,2}

¹School of Instrument Science and Opto-electronics Engineering, Beihang University, Beijing 100191, China

²Key Laboratory of Precision Opto-mechatronics Technology, Ministry of Education of the People's Republic of China, Beijing 100191, China

*Corresponding author, E-mail: fengdanttkl@163.com

Received: 31 March 2017 / **Accepted:** 11 September 2017 / **Published online:** 25 October 2017

Abstract: Structure parameters of Coriolis mass flowmeter play an important role in both the theory and practical applications of accurate measurements. They are not precisely known due to the manufacturing error, but the values thereof lie within the allowed range. This paper is mainly focussed on evaluating the relative impact of structure parameters on performance including the inherent frequency and sensitivity of Coriolis mass flowmeter. In this paper, the inherent frequency and sensitivity of Coriolis mass flowmeter driven by electromagnetic excitation are established, respectively. The sample-based stochastic model is established to investigate the relative influence on performance for Coriolis mass flowmeter considering uncertainty distributions of structure parameters. The results reveal the relative influences and give the key influence parameters, which are verified by simulation experiments. The results can be used as a reference for design and optimization of Coriolis mass flowmeter.

Keywords: Coriolis mass flowmeter; Uncertainty analysis; Inherent frequency; Sensitivity; Structure parameters