

510. Measurement errors of comparator on carriage vibrations

A. Kilikevičius^{1,a}, A. Petraška^{1,b}, S. Juraitis^{1,c}

¹ Vilnius Gediminas Technical University,
Sauletekio al. 11, LT-10223 Vilnius, Lithuania

E-mail: ^a akilikevicius@gmail.com ^b arturas@transvelas.lt ^c sjura3000@yahoo.com

(Received 08 October 2009; accepted 27 November 2009)

Abstract. The main note in this article is to establish the influence of carriage construction and gear mounting modification on the dynamic characteristics of the system. The article investigates how the gear type influences the movement of the carriage. Two cases were considered. In the first case the carriage was moving with friction - gear, in the second case - with strip (string) gear. In this study reliability of vibration measurement system is assessed, which is characterized by measurement estimate uncertainty.

Keywords: carriage construction, vibration measurement system, uncertainty, dynamics.

Introduction

The main objective of this study is to establish the influence of carriage construction and gear mounting exchange on the dynamic characteristics of the system. This research is applicable to the large course metrological associated bar metrics to solve the tasks of comparator. Its results have wider meaning and could be used in the development of other high-precision systems [1-4].

Increase of bar length calibration accuracy required to take into account vibrations and their effects. To assess the impact of vibrations it is necessary to face many new scientific and technical challenges [5-7].

Vibration measurement system reliability could be characterized by uncertainty estimate [8, 9]. For example, the smaller the uncertainty of measurement results, the smaller is the distortion of information resulting in more accurate real technical condition rendering of the object.

Research object

Comparator is made of 4-meters long massive and fine structure granite beams, which are in the horizontal plane on four pneumatic supports, which suppress high-frequency vibrations and carriage that moves along the beam. When the carriage is filled with compressed air into the aerostatic bearings, it starts slipping on the air bearings along the rack crossing six high-precision guides. The carriage is moving along the rack by the program which is managed by