VIBROMOTORS FOR PRECISION MICROROBOTS

APPLICATIONS OF VIBRATION SERIES

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K. Ragulskis, R. Bansevičius, R. Barauskas, and G. Kulvietis, Vibromotors for Precision Microrobots

IN PREPARATION

P. Alabuzhev, A. Gritchin, L. Kim, G. Migirenko, V. Chon, and P. Stepanov, Vibration Protecting and Measuring Systems with Quasi-Zero Stiffness

S. Koroblev, V. Shapin, and Yu. Filatov, Vibration Diagnosis in Precision Instruments

I. Vulfson, Vibroactivity of Branched and Ring Structured Mechanical Drives

K. Ragulskis and Yu. Yurkauskas, Vibration of Bearings

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CONTENTS

PREFACE

Recently, considerable progress has been achieved in all branches of technical sciences and technology; however, especially noticeable changes have taken place in instrument building. In precision instrument building, advances of precision mechanics, optics, electrotechnics, and electronics (as well as automatic and remote control) were being used. Specifications for various types of devices become more demanding: they should be small; reliable; have high responsiveness and high efficiency; and be able to perform in extreme conditions (in vacuum, under acceleration and vibratory overloads, in a wide temperature range, and at increased radiation). Especially strict requirements have been imposed for actuation elements and drives of precision devices and instruments.

Electromotors do not always satisfy the increased demands; they have a large time constant, introduce elements of low rigidity into the dynamic system, and have a limited range of speed. The resolution of electric motors (including stepper motors and motors with reducers) is relatively low and is measured in units of angular minutes or tenths of a millimeter in the linear drives. Such characteristics cannot satisfy the increased demands of electromechanical units. Therefore, the development of a new type of drive, based on the transformation of high-frequency microvibrations into directed motion, is of great interest to designers of precision devices.

By analogy, with electrical, pneumatic, and hydraulic motors, the authors