Monolithic Two-Axis Flexure-Joined Mirror Support

Tino Noll

BESSY GmbH, Albert-Einstein-Strasse 15, D-12489 Berlin-Adlershof
Phone: + 49 - (30)6392 4655; Fax: + 49 - (30)6392 4649
E-mail: noll@bessy.de

Abstract

At BESSY an infrared beamline was designed and built. In order to fulfill the stringent requirements a basically new mirror moving mechanism was developed (Figure 1). This unit is based on a monolithic body that contains two independent segments of rotational symmetric flexure hinge patterns [1,2]. The design provides two rotational axes that intersect the midpoint of the mirror surface normal to each other and parallel to the mirror surface. The flexure hinge patterns interpenetrate in two orthogonal directions. The monolithic body additionally includes the elastically loaded kinematic mirror mount. Its motion is driven by two linear feedthroughs.

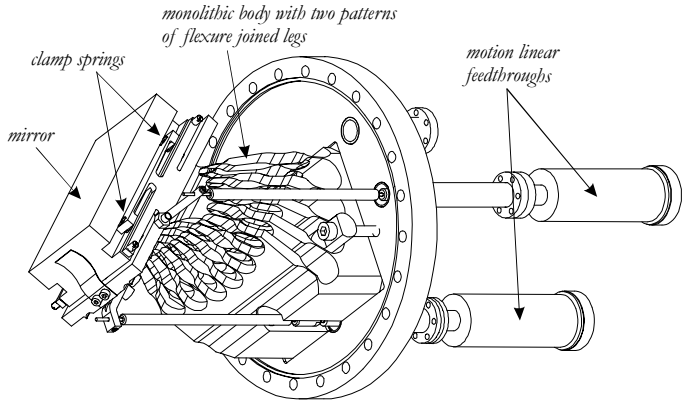

Figure 1: Two-axis rotational flexure-joined mirror moving mechanism, complete assembly.

Advantages over classical mirror moving mechanisms are that it: requires only minimal space, works very smoothly, producing a high positioning accuracy, and is vibrationally stiff. Because of the monolithic design, the UHV compatibility is good.

The presentation includes design parameters and the motion behaviour of the assembly as well as other particular features of the infrared beamline.

References

[1] Stuart T. Smith, *Flexures, Elements of Elastic Mechanisms* (Gordon and Breach Science Publishers) 2000.

[2] D. Shu, "Ultraprecision Motion Control Technique for High-Resolution X-Ray Instrumentation" Proc. of the 1st Int'l. Workshop on Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation, Paul Scherrer Institute, Villingen, Switzerland, July 2000.

Keywords: mirror support, weak link mechanism

Presentation: Oral