Development of a depth controlling nanoindentation tester (Nagaoka University of Technology and ELIONIX Corp.)

Features

- Adopting low thermal expansion materials for the frame and stages to reduce errors due to the thermal expansions.
- The current of electromagnetic coil is feedback controlled by the relative displacement between the indenter and the sample. This is effective to suppress the effect of the vibration of the foundation.

Fig. 1: Dynamic model of the developed nanoindentation system.

Fig. 2: Block diagram of the developed system. s means complex frequency. ω_0 and ζ are the natural frequency and the damping ratio of the indenter suspension system, respectively. Ω_0 and Z are the natural frequency and the damping ration of the vibration isolator, respectively.

Fig. 3: The angular frequency of the foundation, ω , vs displacement transmissibility from the foundation to the relative displacement between the indenter and sample surface, H/X_3 . S in the figure means contact stiffness.

Fig. 4: Photograph of the developed nanoindentation tester.