

VIBRATION CHARACTERISTIC OF STABLE SUPPORT STAND USING CORDIERITE CERAMIC

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We have developed a stable ceramic stand in order to support the high-precision BPMs: beam position monitors and focusing elements along the SCSS X-ray FEL accelerator. The support (Fig. 1-A) made by cordierite material that has a very low thermal expansion coefficient of $\sim 2 \times 10^{-6} / ^\circ\text{K}$. The inside of the stand is filled with sand to increase inertia by sand weight and to increase its vibration dumping by friction among its grains. By the above mentioned devices, the stand provides lower mechanical vibration amplification. In this presentation, we show how stable the cordierite stand is. For example, the vibration amplification was evaluated by a comparison between earth background vibration data measured by seismometers set on the stand and floor. The low frequency components below 0.1 Hz of the data include the amplification dependent on the thermal expansion of the stand. The effect of the vibration damping was compared between the cordierite stand and the stainless steel stand as shown in Fig. 1-B. The impulse responses for the comparison as shown in Fig. 2 were measured by vibration generated by a hammer. The dumping time of the cordierite stand is about a hundred times lower than that of the stainless stand. The response of the stands to strong vibration was also measured by using a shaker with rotating eccentric mass on the stands. In each case of the above mentioned measurements, the cordierite stand had smaller vibration amplification and bigger dumping than that of the stainless stand.

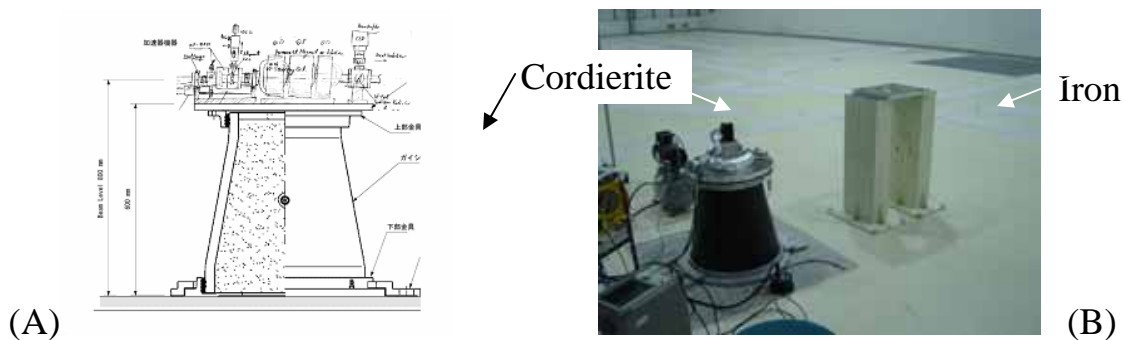


Fig. 1. Schematic drawing (A) and a photo (B) of the cordierite stand and the stainless steel stand

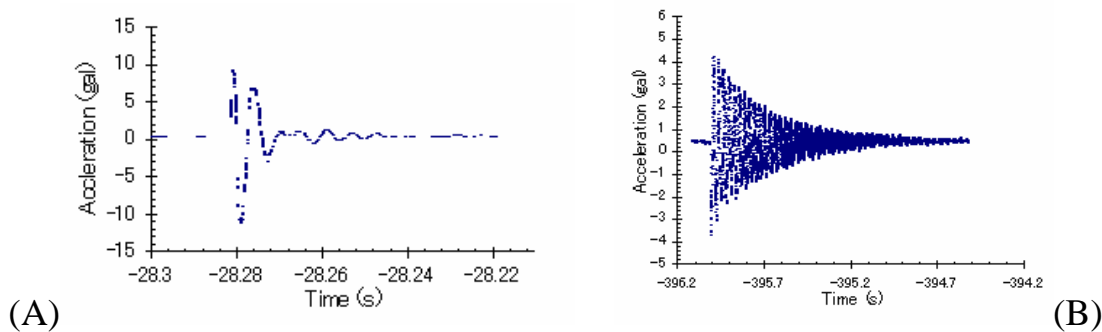


Fig. 2. Impulse responses of the cordierite stand (A) and the iron stand (B)