Mechanical Stability Studies at Taiwan Light Source

J.R. Chen,[a, b] D.J. Wang,[a] C.K. Kuan,[a] Z.D. Tsai,[a] J.C. Chang,[a]
Y.C. Chang,[a] and Y.C. Lin[a]

a Synchrotron Radiation Research Center (SRRC), Hsinchu 300, Taiwan
b Department of Nuclear Science, National Tsing-Hua University, Hsinchu 300, Taiwan
Phone: +886-(0)3-5780281; Fax: +886-(0)3-5783890
E-mail: jrchen@srrc.gov.tw

Abstract

Thermal and mechanical effects on the stability of beam orbit and beam size were investigated at the Taiwan Light Source (TLS). Most of the sources and routes that vary the beam orbit and beam size were identified. The outdoor temperature, cooling system capacity, device linearity, control parameters, and even electrical line voltages influence the stability of air temperature, water temperature, and/or mechanical structures. The stability of the beam orbit and beam size, as well as the reliability of the monitoring system were improved after reducing the thermal and mechanical fluctuations. A beam orbit fluctuation of < 1 μm (rms) and a drift of < 5μm/8hr (one shift) were achieved without using an orbit feedback system. A beam size fluctuation of < 0.3μm was estimated from an intensity fluctuation of ~ 0.2% of the photon beam through an aperture in the photon beamline.

Keywords: beam stability, temperature, mechanical, electrical

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