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Studies on transforming method of multi-system displacement monitoring system to global coordinate system in particle accelerators

The multi-system displacement monitoring system is designed and established to achieve the goals of position monitoring and benchmarks in high accuracy, by which the monitoring data can be reviewed in the global coordinate system and relative position displacement can be transformed to absolute position displacement. The system consists of Hydrostatic Leveling System (HLS), Wire Position Sensor (WPS), SpotOn and Inclination Sensors (IS). HLS is used to monitor the displacement in vertical direction, WPS and SpotOn are used to monitor the displacement in vertical and horizontal directions based on different principle. IS can obtain angle variations in biaxial directions. The calibration experiments of newly imported optical WPS are designed to obtain the accuracy, RMS and resolution. A series of experiments are executed after the installation and debugging of the whole system, including monitoring data comparison and coordinate system transformation of the data of HLS and WPS from sensors themselves to the global coordinate system. The measurement data of HLS and WPS are compared by combining with those of IS and SpotOn. The transformation from initial Sensor coordinate system to the platform coordinate system that established by some target ball bases of laser tracker in platform takes advantage of SA by combining with the measurement data of CMM and laser tracker. The transformation from five Platform coordinate systems to the SYSTEM coordinate system is made by combining with the measurement data of WPS and laser tracker. Then the SYSTEM coordinate system has been transformed to the Global system by the spatial measurement data from laser tracker.

Summary

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