

## A Sectional Control Method to Decrease the Accumulated Survey Error of Tunnel Installation Control Network

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**Abstract :** In order to decrease the accumulated survey error of tunnel installation control network of particle accelerator, a sectional control method is proposed. Firstly, the accumulation rule of positional error with the length of the control network is obtained by simulation calculation according to the shape of the tunnel installation-control-network. Then, the RMS of horizontal positional precision of tunnel backbone control network is taken as the threshold. When the accumulated error is bigger than the threshold, the tunnel installation control network should be divided into subsections reasonably. On each segment, the middle survey station is taken as the datum for independent adjustment calculation. Finally, by taking the backbone control points as faint datums, the weighted partial parameters adjustment is performed with the adjustment results of each segment and the coordinates of backbone control points. The subsections are jointed and unified into the global coordinate system in the adjustment process. An installation control network of the linac with a length of 1.6 km is simulated. The RMS of positional deviation of the proposed method is 2.583 mm, and the RMS of the difference of positional deviation between adjacent points reaches 0.035 mm. Experimental results show that the proposed sectional control method can not only effectively decrease the accumulated survey error but also guarantee the relative positional precision of the installation control network. So it can be applied in the data processing of tunnel installation control networks, especially for large particle accelerators.

**Keywords :** alignment, tunnel installation control network, accumulated survey error, sectional control method, datum

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