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A Calibration Method of Portable Coordinate Measuring Arm Using Bar Gauge with Cone Holes

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Abstract : The calibration of the articulated arm coordinate measuring machine (AACMM) is key to improving calibration accuracy and saving calibration time. To reduce the time consumed for calibration, we should choose the proper calibration gauges and develop a reasonable calibration method. In addition, we should get the exact optimal solution by accurately removing the rough errors within the experimental data. In this paper, we present a calibration method of the portable coordinate measuring arm (PCMA) using the 1.2m long bar guage with cone-holes. First, we determine the locations of the bar gauge and establish an optimal objective function for identifying the structural parameter errors. Next, we make a mathematical model of the calibration algorithm and present a new mathematical method to remove the rough errors within calibration data. Finally, we find the optimal solution to identify the kinematic parameter errors by using Levenberg-Marquardt algorithm. The experimental results show that our calibration method is very effective in saving the calibration time and improving the calibration accuracy.

Keywords : AACMM, kinematic model, parameter identify, measurement accuracy, calibration
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