Prediction-Correction Algorithm of Cubic B-Spline Curve Interpolation in Industrial Robot Control System Based on LinuxCNC

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Abstract— In order to make industrial robot control system based on LinuxCNC have the ability to process free curves, this paper studies the B-Spline curve's mathe-matics model and interpolation principle. Due to the large time complexity of Taylor series interpolation algorithm, a prediction-correction method of Cubic B-spline curve interpolation algorithm was proposed to calculate the parameter of next position. Since Motion controller is the core component of LinuxCNC, this paper studies the architecture of LinuxCNC's Motion controller and modify the source code of LinuxCNC to add the function of B-spline interpolation. The simulation results of MatLab proved that the prediction-correction B-spline interpolation algorithm take less time in calculating the parameter of next interpolation step. The simulation results in LinuxCNC show that the industrial robot can process complex free curves by B-spline interpolation after entering the corresponding control point.

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