

TABLE 2. Error model with kinematic parameter-independence

	ΔX_r	ΔY_r	ΔZ_r	ΔI_r	ΔJ_r	ΔK_r
Error	Error Gain					
EXX	1	0	0	0	0	0
EYX	0	1	0	0	0	0
EZX	0	0	1	0	0	0
EAX	0	-Z _m	0	0	-1	0
EBX	Z _m	0	0	1	0	0
ECX	0	0	0	0	0	0
EXY	1	0	0	0	0	0
EYY	0	1	0	0	0	0
EZY	0	0	1	0	0	0
EAY	0	-Z _m	0	0	-1	0
EBY	Z _m	0	-X _m	1	0	0
ECY	0	X _m	0	0	0	0
EXZ	1	0	0	0	0	0
EYZ	0	1	0	0	0	0
EZZ	0	0	1	0	0	0
EAZ	0	0	0	0	-1	0
EBZ	0	0	0	1	0	0
ECZ	0	0	0	0	0	0
COX	0	X _m	0	0	0	0
AOZ	0	-Z _m	0	0	-1	0
BOZ	Z _m	0	0	1	0	0

V. Conclusion

Three-axis geometric error models derived using traditional methods all set the machine reference coordinate systems at a fixed point on the base of the machine and depend on the machine kinematic chain to derive a kinematic parameter-dependent model. For practical applications, this dependence makes accurate kinematic parameters impossible to obtain, the operation of measurement devices is inconvenient, and overall error is overvalued. For this reason, this paper created a measurement method integrating “modeling, measurement, and compensation for geometric error model of three-axis machine tools using a kinematic parameter-independent” technique. This technique, integrating simple measurement methods, was used to construct a corresponding three-axis geometric error model and compensation model. The geometric error model is machine kinematic parameter-independent, making it a practical, convenient, and accurate method of measurement.

Acknowledgment

Financial support was granted by the National Science Council, Taiwan, ROC, under contract NSC 102-2218-E-027-

014 , Precision Machinery Research Development Center, under contract 101TR02 and Industrial Technology Research Institute, under contract B200-103BE1.

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