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Title: A Bidirectional Curve Network Based Sampling Method for Enhancing the Performance in Measuring Ultra-precision Freeform Surfaces

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Research Highlights

- Measuring ultra-precision freeform surfaces with submicrometer form accuracy and nanometric surface finish demands a large number of measurement points for fully characterizing the surface geometry and reducing the measurement uncertainty.

- A bidirectional curve network based sampling (BCNBS) method is presented for enhancing the performance in measuring ultra-precision freeform surfaces

- The BCNBS method is based on scanning two sets of curves on the measured surface along two different directions to form a curve network which is used to construct a substitute surface to represent the measured surface.

- Experimental results demonstrate that the BCNBS method provides superior performance in terms of higher sampling accuracy, less measuring time and higher sampling efficiency as compared to the conventional raster sapling (RS) method.

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