Accepted Manuscript

Title: An improved signal determination method on machined surface topography

Author: Jingjing Sun Zhanjie Song Gaiyun He Yicun Sang

PII: S0141-6359(17)30143-5
DOI: http://dx.doi.org/doi:10.1016/j.precisioneng.2017.09.004
Reference: PRE 6654

To appear in: *Precision Engineering*

Received date: 8-3-2017
Revised date: 30-8-2017
Accepted date: 5-9-2017

Please cite this article as: Jingjing Sun, Zhanjie Song, Gaiyun He, Yicun Sang, An improved signal determination method on machined surface topography, *<![CDATA[Precision Engineering]]>* (2017), http://dx.doi.org/10.1016/j.precisioneng.2017.09.004

An improved signal determination method on machined surface topography

Jingjing Sun[a,b], Zhanjie Song[a], Gaiyun He[b,], Yicun Sang[b]

[a]*School of Mathematics, Tianjin University, Tianjin 300354, China*
[b]*Key Laboratory of Mechanism Theory and Equipment Design of Ministry of Education, Tianjin University, Tianjin 300354, China*

Abstract

The characteristic signals of the machined surface are a mixture of actual signals and noise. It is feasible to make the features distinct through wavelet denoising. However, some of the deterministic signals may be lost with noise removed resulting in the loss of energy which make it difficult to judge the real components of the surface. An improved signal determination method —— wavelet denoising with compensation of the loss (WDCL) is proposed in this paper. The compensation method uses ensemble empirical mode decomposition (EEMD) and transfer function in which instantaneous frequency is calculated by Hilbert transform (HT). The coefficients of the transfer function are adjusted by improving the passing rate of the deterministic signals and lowering the passing rate of noise. The result shows that the WDCL can enhance the resolution of the real signals and reduce noise further.

Keywords: Wavelet denoising, Ensemble empirical mode decomposition, Transfer function, Compensation

1. Introduction

Machined surface feature is composed of dissimilar components varying in scale or frequency, these components contain useful information to trace errors

*Corresponding author
Email address: hegaiyun@tju.edu.cn (Gaiyun He)
URL: (Jingjing Sun)