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Abstract

An effective rough surface model is the foundation for the evaluation of the contact, lubrication, friction and wear behaviors of engineering assemblies. This study first presented an investigation of the time series method, linear transformation method and Johnson transformation system. Then, an improved rough surface modeling method was proposed. The solving of the autocorrelation coefficient matrix was transformed to a nonlinear least squares problem and the analytical gradient formula was derived. The fast Fourier transform (FFT) method was further employed to improve the computational efficiency. Using this approach, rough surfaces with different autocorrelation function (ACF) and statistical parameters were generated and then compared with the prescribed surfaces. It was found that the ACF, areal autocorrelation function (AACF) and statistical parameters of the simulated surfaces were consistent with those of the prescribed surfaces. Moreover, an extremely good agreement was also found between the measured and generated grinding surfaces in terms of ACF, AACF and statistical parameters, which further proved the validity of the proposed method at large autocorrelation length. Therefore, the technique

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