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Surface imperfection and wringing thickness in uncertainty estimation of end standards calibration

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Empirical estimation of uncertainty in dimensional metrology is a vital part in calibration processes.Uncertainty estimation in gauge block measurement mainly depends on three major areas, thermaleffects, dimension metrology system that includes measurement strategy, and end standard surface perfection grades. This presentation focuses precisely to estimate the uncertainty due to the geometrical imperfection of measuring surfaces and wringing thickness U(LgþLw) in calibration of end standards grade 0. An optomechanical system equipped with Zygo interferometer and AFM techniques have been employed. A novel protocol of measurement covering the geometric form of end standard surfaces and wrung base platen was experimentally applied. Surface imperfection characteristics of commonly used 6.5 mm GB have been achieved by AFM in 2D and 3D to be applied in three sets of experiments. The results show that there are obvious mapping relations between geometrical imperfection and wringing thickness of the end standards calibration. Moreover, the predicted uncertainties are clearly estimated within an acceptable range from 0.132 to 0.202 mm respectively. Experimental and analytical results are also presented and discussed.

Biography

Ihab H Naeim is an expert in optical dimensional metrology. He has completed his PhD practical studies in Institute of Micro-technology (IMT- Switzerland, 2000/4) and Postdoctoral studies at PTB- Germany, 2008. He was principal researcher at end and line standards lab at national institute of standards (NIS - Egypt). Currently, he is Head of Physics Dept. at Taibah University-Yanbu, KSA. Most of his scientific papers have been published in metrology field in reputed journals, and is serving as a Referee of Engineering physics projects for some of KSA universities

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