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"Laser-ultrasonic profilometry"

Supervisor

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Current work is focused on the investigation of solid surface profilometry with laser-ultrasonic tomography method. A prototype of real-time laser-ultrasonic profilometer is tested. CUDA technology of parallel computations on graphics processing units is used for real-time signal processing with back-projections method. Experimental and numerically simulated by Rayleigh integral point spread functions are compared to test algorithms and experimental setup. An algorithm for linear spline of surface profile is proposed. Model cone objects and cylindrical objects with grooves are experimentally investigated. In case of low angle between antenna axis and object surface the longitudinal resolution of 25 microns with confidence level 95% is achieved. The advantages of laser-ultrasonic profilometry and recommendations for optimized receiving antenna are considered.