

COMPUTER MODELS OF LASER SPECKLE-INTERFEROMETER OF LATERAL MICRO DISPLACEMENT OF SCATTERING OBJECT

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The formation of interference pattern in the diffraction field of a two inclined laser beams scattered by rough surface of objects in laser speckle-interferometer of lateral micro displacement are studied. The results of numerical simulation of speckle-modulated interference pattern at lateral micro displacements of object during its heating and cooling are presented. Graphs of lateral displacements during heating and cooling of the objects obtained from interferograms over time during heating and cooling at the point on the axis of laser speckle-interferometer. A nature scheme of laser speckle-interferometer for measurements of lateral micro displacements in natural experiments are developed.

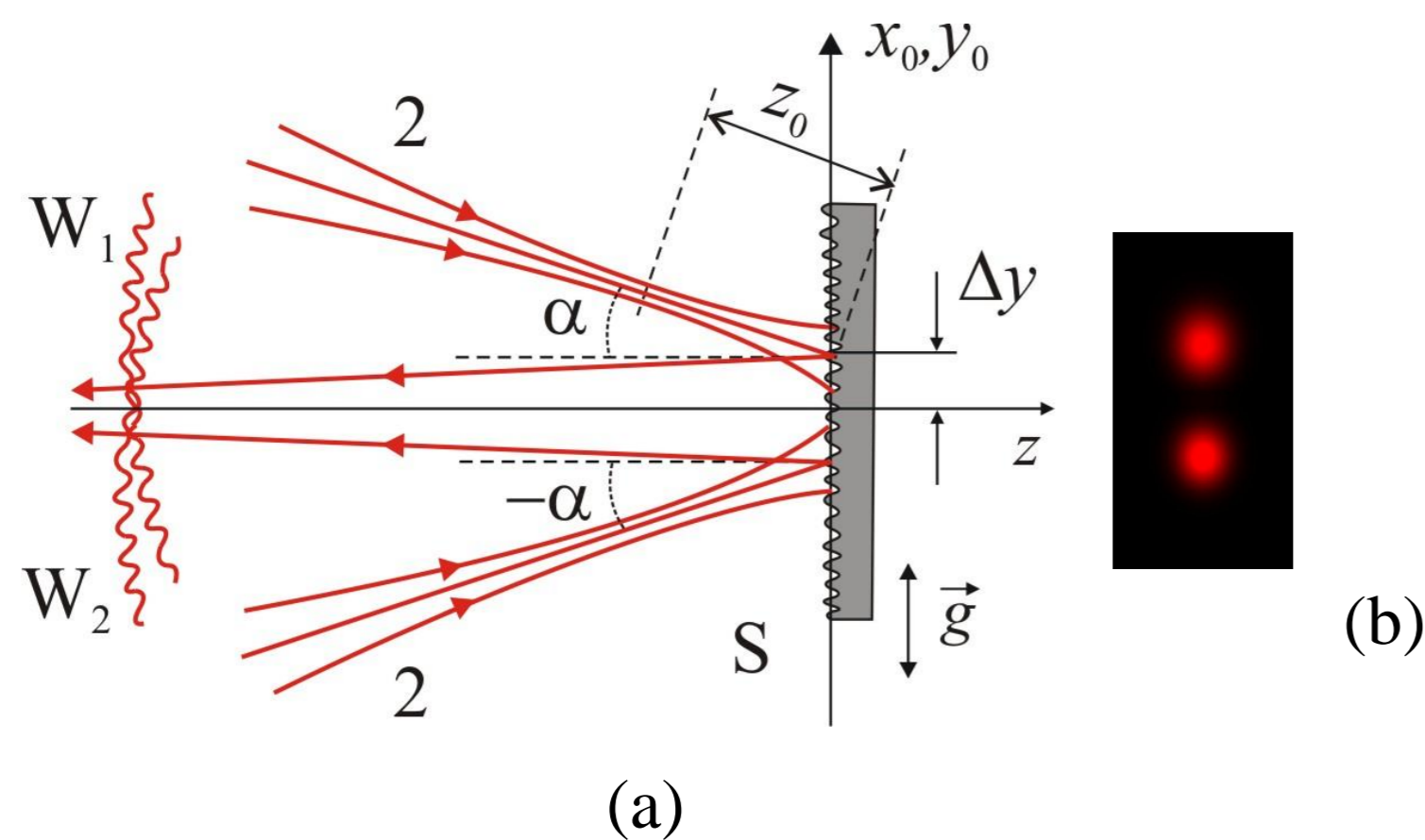


Fig. 1. (a) Scheme of the laser speckle interferometer of lateral micro displacements of scattering object S; (b) – laser light spots on the scattering surface

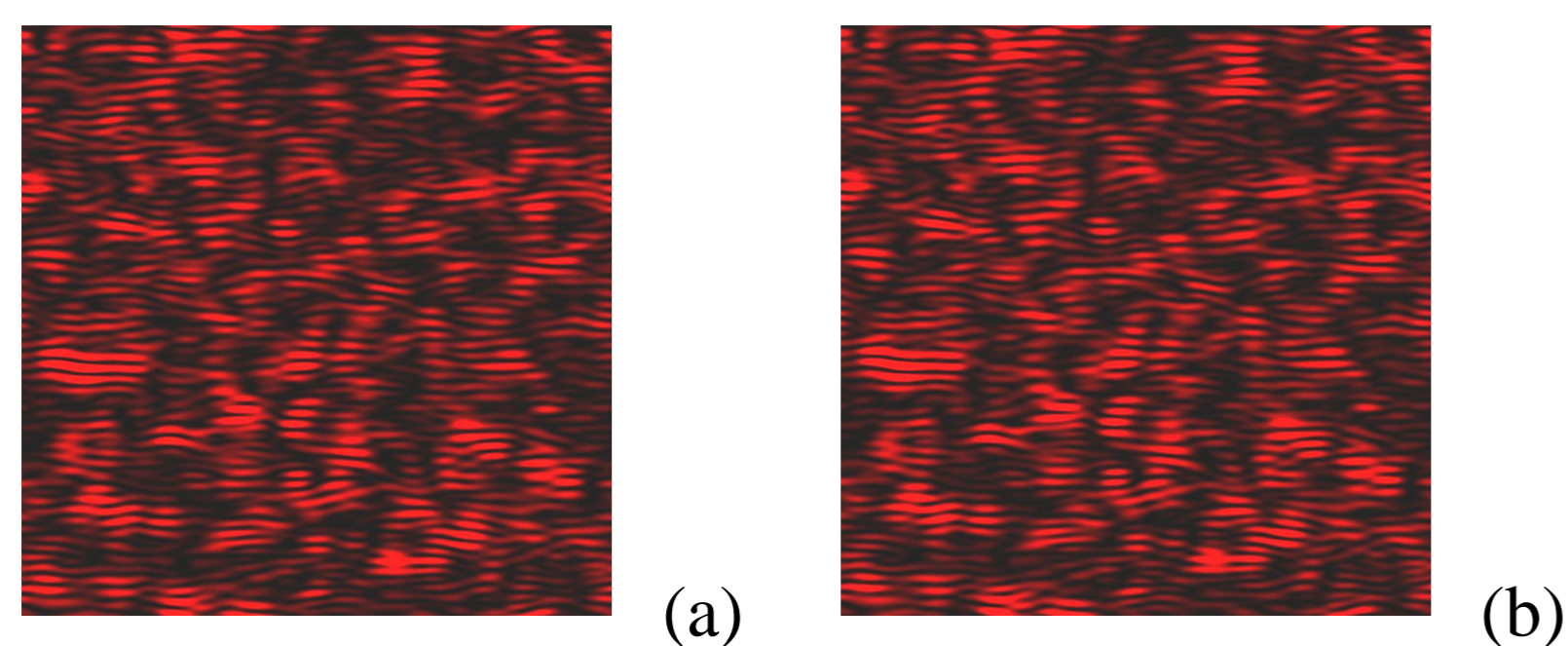


Fig. 2. Simulated speckle-modulated interference patterns formed at the interferometer output at different values of lateral displacement of the scattering surface g :
a - $g = 0$; b - $g = 0.52 \mu\text{m}$;
the radius of waist of the illuminating laser beams $w_0 = 3 \mu\text{m}$;
the distance from the waist to illumination plane of the scattering surface is $z_0 = 45 \mu\text{m}$,
the wavelength $\lambda = 0.63 \mu\text{m}$,
the size of the images is $400 \times 400 \mu\text{m}$

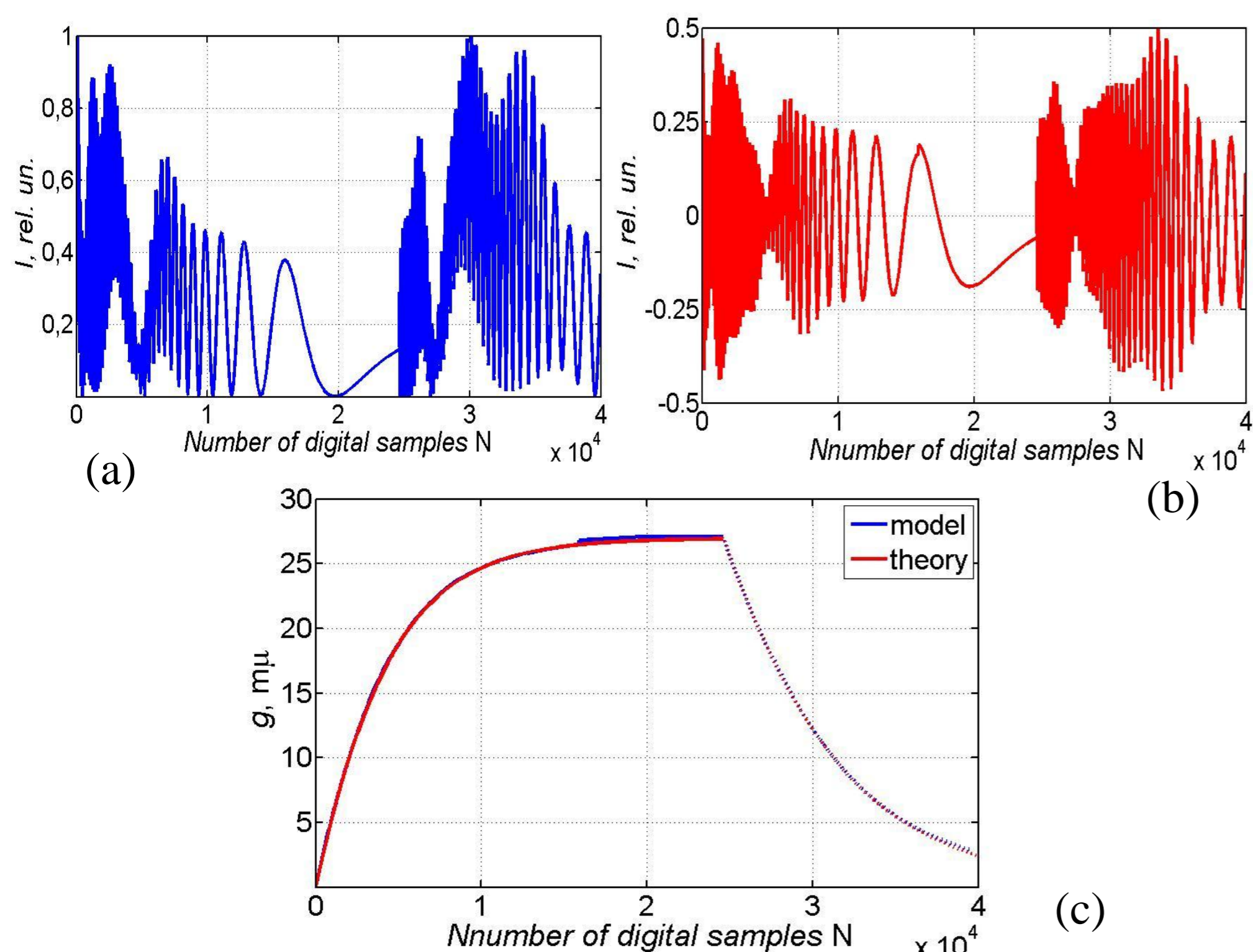


Fig. 4. Modeled interferogram obtained in the far diffraction region at lateral surface displacement (a); processed interferogram with subtracted average values (b); reconstructed displacement plot (c)

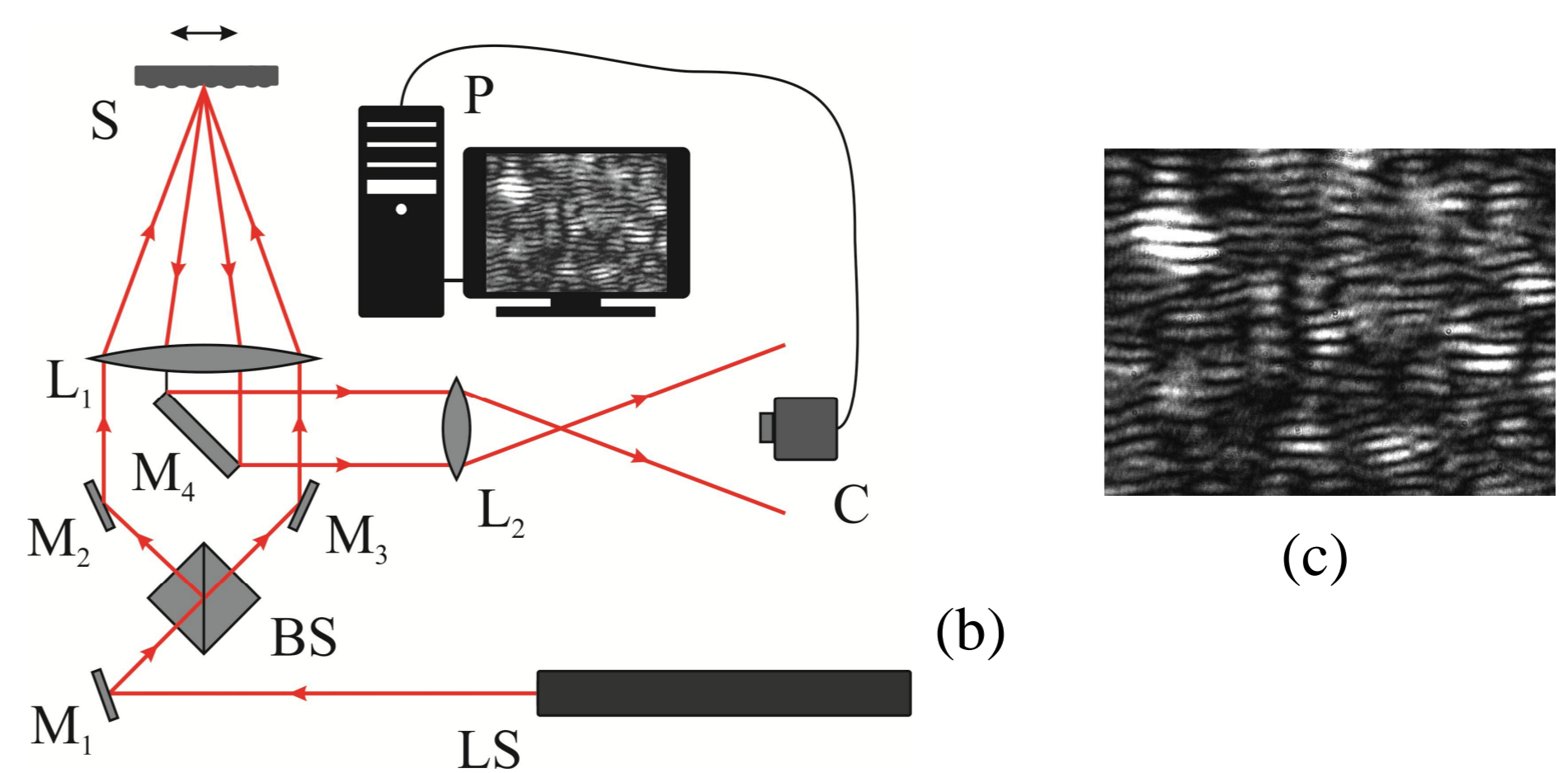
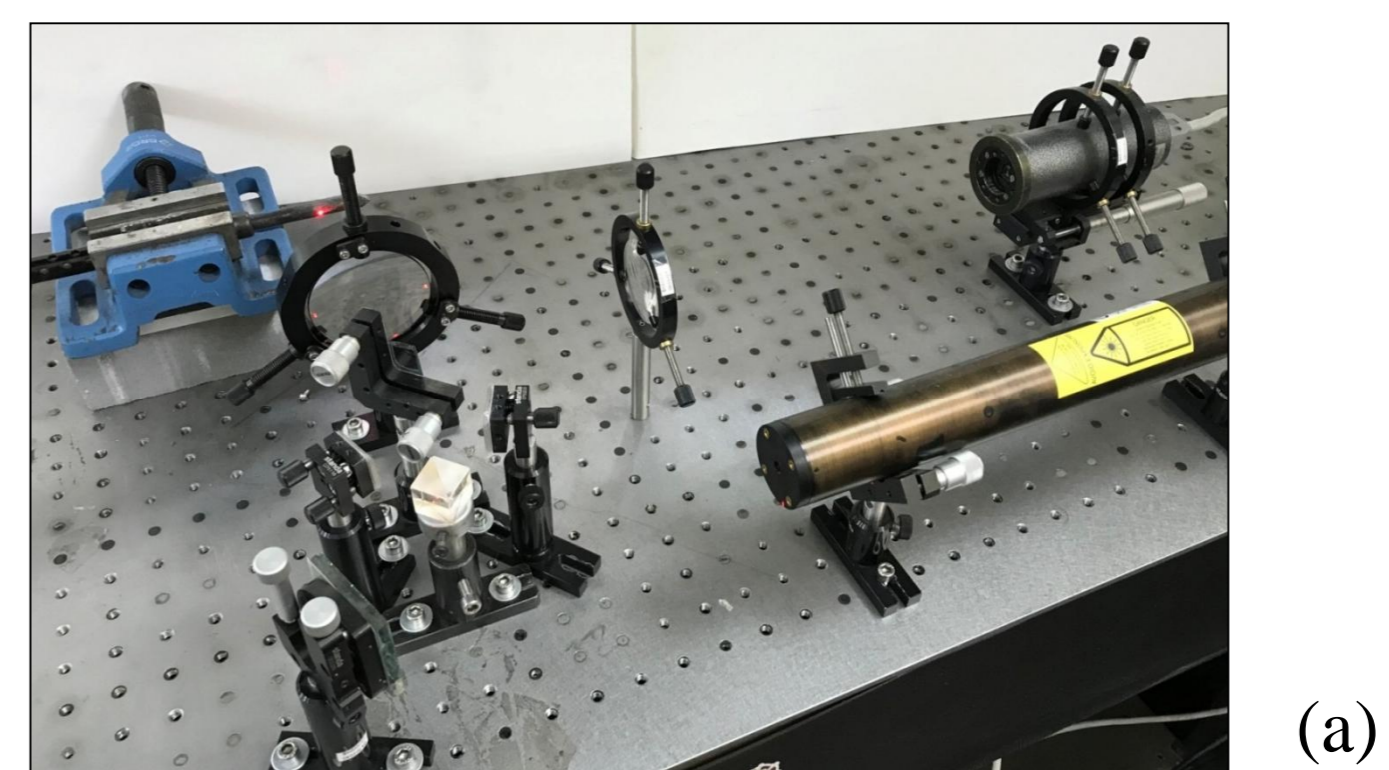


Fig. 3. Photo (a) and scheme (b) of experimental setup. Experimental speckle-modulated interference pattern (c)

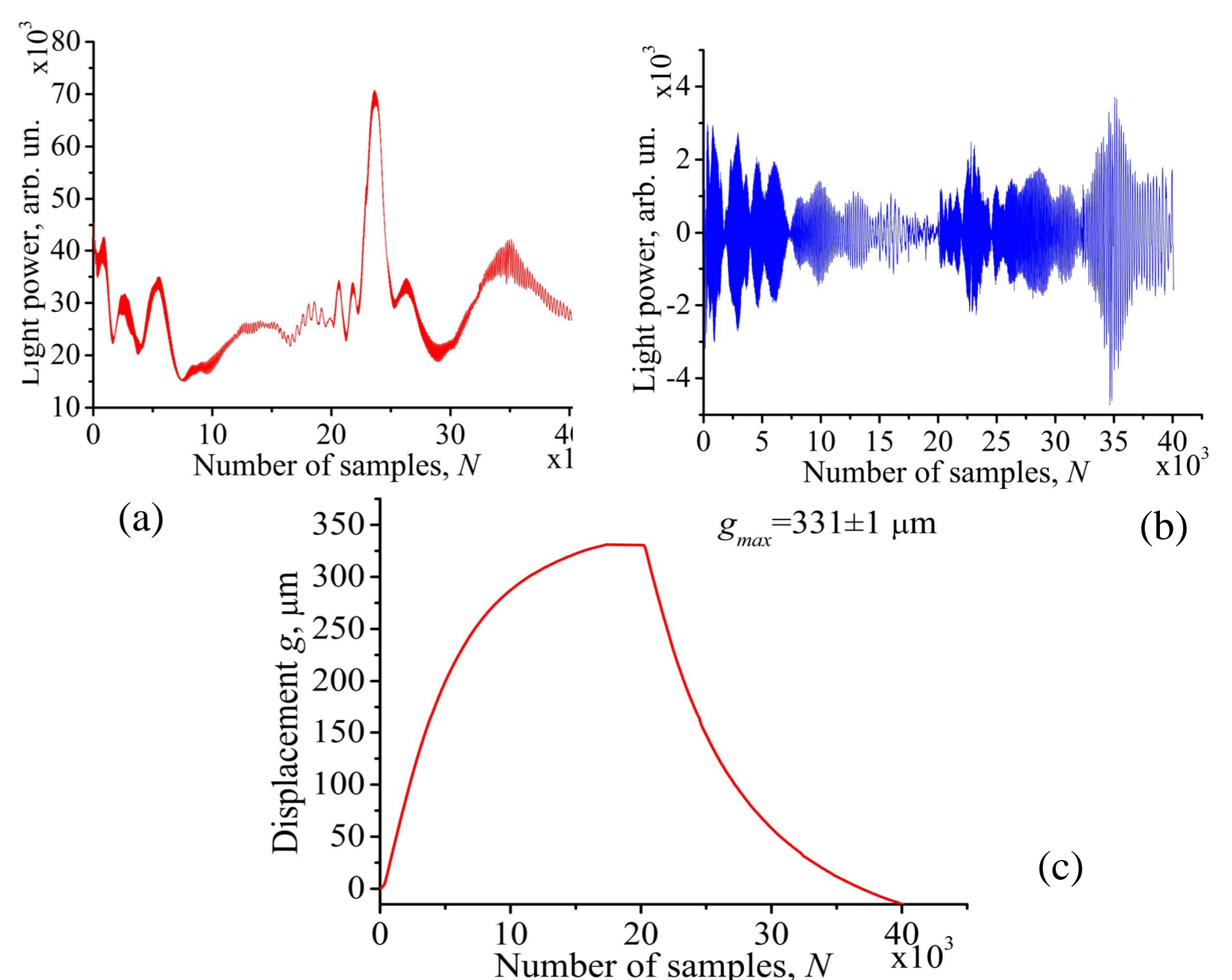


Fig. 5. Experimental interferogram (a) and processed interferogram after high-frequency filtering (b); surface displacement plot reconstructed from interferogram (c)