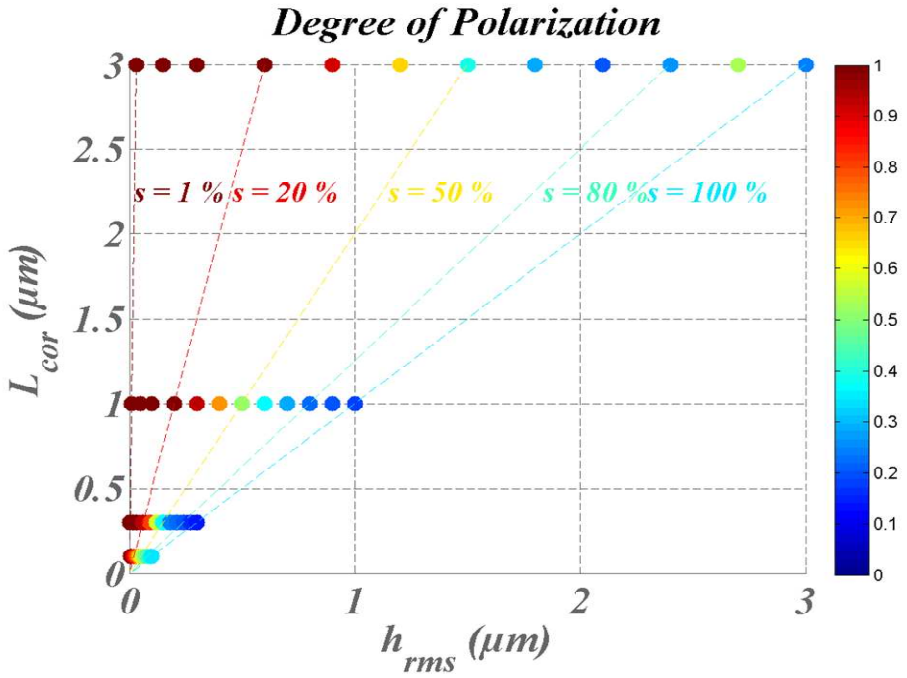

Fig. 10. MDOP(1°) levels versus roughness and correlation length.

7. Conclusion

An exact calculation method was used to predict the gradual loss of polarization induced by surface roughness in a spatial average process. The results allow to predict the depolarization efficiency of scattering samples versus their surface topography. While perturbative surfaces cannot depolarize light, surfaces with 100% slopes reduce polarization to a value close to DOP = 0.2 within a 1° detector aperture for Lcor = 0.3 µm. A multi-scale function (MDOP) was also calculated to analyze the DOP variations versus receiver aperture $\Delta\Omega$, which revealed a ripple in the calculation range. Also, averages values of the MDOP($\Delta\Omega$) were shown to exhibit power law behaviors that can be used as additional signatures of the samples topography. All results can be helpful to analyze or predict the optical contrast when polarized interferences are measured on light scattering within a particular solid angle.

#128675 - $15.00USD Received 18 May 2010; accepted 24 Jun 2010; published 12 Jul 2010