

Abstract

This thesis proposes a system design of a direct measurement method of types and sizes of particle on surfaces of hard disk drive components. To design the system, firstly, Rayleigh, Mie and Geometric scattering theory are studied and the BRDF models are simulated by using MIST program. The results of the BRDF models are compared to the experimental results of the other research groups. Secondly, the types and sizes of particle are divided into three categories which are 1) particles with small sizes ranged from 0.001 – 0.01 μm , 2) particles with medium sizes ranged from 0.2 – 0.6 μm , and 3) particles with large sizes ranged from 250 – 5000 μm . Studied light scattering theory of three categories particle is simulated by using MIST program, in order to do the experiment measure with large particle sizes because easily control quantity and position of particle. Thirdly, experiment measure with four large particles size types, are including to steel (Fe), silica gel (SiO_2), zirconium dioxide (ZrO_2) and polyethylene (PE). The constrain of this experiment with using laser wavelength 0.6328 μm which is incident angle and scattering angle equal 89 degree, and azimuth angle 0 to 150 degree by using 15 points. After compared the result with BRDF result, the system showed discrepancy approximately 9.95 percent. Result of experiment with simulation can be system design measurement in range medium sizes of particle.