Abstract

Multiple Light Scattering in Multistratified Media: Model, Experiment

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The model presented here is based on the resolution of the radiative transfer equation (R.T.E.), by the Discrete Ordinate Method (D.O.M.), in the steady-state domain. A matricial formulation leads to the resolution of the problem of light scattering through multislabs, with index mismatch at each interface. In that way, the spatial distribution of out-going fluxes, the Bidirectional Scattering Distribution Function (B.S.D.F.), is obtained. A complete dissociation between volume scattering and interfaces behavior allows the introduction of elaborated theories to describe them properly. For instance, to account for interactions between scatterers, when high volume fractions are considered, we introduce the so-called Multiple Dependent and Coherent (M.D.C.) light scattering theory. Theoretical calculations are compared to experiments obtained with a spectro-scatterometer designed in our laboratory, dedicated to the measurements of the B.S.D.F. Experiments have been performed on colloidal latex beads suspensions (diameter 0.1 and 3μm) with high volume fraction (1,5% and 4%), placed into silica plates and different thickness (5mm and 100μm) are considered. For the cases considered, strong interaction between scatterers is taken into account.

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