



## Transmission Fluctuation Correlation Spectrometry: Characterization of Particle Suspensions and Flow Structures

By Xiaoi Guo

Cuvillier Verlag Okt 2007, 2007. Taschenbuch. Condition: Neu. Neuware - When a beam of light falls upon a flowing particle suspension, the transmitted light intensity fluctuates temporally, depending on the beam diameter and the properties of particle systems. In this thesis a new approach called transmission fluctuation correlation spectrometry (TFCS), including the autocorrelation technique (TFS-AC) and spatial correlation technique (TFS-SC), has been developed in detail and applied to characterize the flowing particle suspensions and flow structures. In view of the concentration effects of hard-core spherical particles in the suspension, a direct correlation function (DCF) of two-dimensional hard sphere fluids was proposed and applied to investigate the transmission fluctuations of radiation through a dense suspension by the TFCS technique. Based on the layer model, a general analytical expression of the expectancy of the transmission product (ETP) was presented under the assumptions of geometrical ray propagation and hard spherical particles in the suspension. Obtained transition spectrum can be applied to extract the particle size distribution (PSD) and particle concentration simultaneously. Furthermore, we extended the theory to the case of crossed beams as well as to the case of partially transparent particles with penetrating radiation. Compared with the expectancy of the transmission square (ETS)...

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