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The near wall TIRFM measurement of nano-tracer's statistical intensity distribution (SID) and determining the base intensity $\mathbf{I_0}$ XU ZHENG, LNM, Institute of Mechanics, CAS, LNM TEAM — The total internal reflection fluorescence microscopy (TIRFM) is an evanescent-wave-based technique for measuring nanoparticle dynamics very close to wall. The intensity of the evanescent wave decays exponentially (i.e. $I(z)=I_0\exp(z/z_p)$), which can provide information of the tracer particle position not just parallel but also normal to wall. However, considering the z information is encoded in tracer intensity, it is critical to determine the base intensity I_0. In this study, we will first establish a model to describe the statistical intensity distribution (SID) of the nano-tracers observed in the evanescent field inspired by the works of Huang et al.. A different function of particle-wall interaction and a term of the influence of the objective focal plane thickness are introduced in the present SID method. Then, TIRFM experiments are performed to measure the histogram of SID. The experimental histogram of SID is then fitted by the theoretical curve to determine I_0 which is the only one fit parameter. By near wall velocity measurement, we will show that the SID method has a very high precision in determining I_0 and the vertical z position of every nanotracer. Further tests show that the PDF of nano-tracers can reveal more information about how nanoparticles interact with the charged solid wall. This provides a promising method to detect the physical properties near interface.

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