

FY8201 / TFY8 Nanoparticle and polymer physics I

EXERCISE 7

A) A sphere of radius σ is placed in a fluid flowing with a stationary and homogenous velocity field \vec{u} . The sphere perturbs the velocity field an amount \vec{v}' . Based on Eq. (5.46)-(5.47) in lecture notes, sketch \vec{v}' on vector form in a representative number of points around the sphere.

B) Sketch the pressure distribution on the sphere in A) e.g. by drawing arrows on the sphere surface.

C) Calculate the friction coefficient of a spherical shaped airbubble in a Newtonian fluid.

Hint: The calculation may be done similar to what is done in the lecture notes Ch. 5.2.1 for a solid sphere, however, the boundary conditions on the sphere surface must be updated. (The “sticking condition” does not apply to the bubble!)