# Dynamics of a particle and a quantized vortex at zero temperature : self-consistent calculation

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Many experiments for visualizing quantized vortices and normal fluid flow have been performed in superfluid $^4$He. Recently, metastable $He_2$ excimer molecules are used as tracer particles[1]. As their radius is only about $10^{-10}$m, they hardly perturb the system, thus being a good candidate of tracer particles. In order to understand the interactive motion of $He_2$ molecules and vortices at zero temperature, we numerically study the trapping diameter by using the self-consistent equations of motions. We calculated the trapping diameter as a function of the initial velocity of the particle. The trapping diameter is almost inversely proportional to the initial velocity of the particle and compared with the observation.

1. D. E. Zmeev et al, *Phys. Rev. Lett.* **110**, 175303, (2013).