Long Time Tail of the Velocity Autocorrelation Function in a Two-Dimensional Moderately Dense Hard Disk Fluid MASAHARU ISOBE, Nagoya Institute of Technology — Alder and Wainwright discovered the slow power decay $\sim t^{-d/2}$ (d:dimension) of the velocity autocorrelation function in moderately dense hard sphere fluids using the event-driven molecular dynamics simulations. In the two-dimensional case, the diffusion coefficient derived using the time correlation expression in linear response theory shows logarithmic divergence, which is called the "2D long- time-tail problem". We revisited this problem to perform a large-scale, long-time simulation with one million hard disks using a modern efficient algorithm and found that the decay of the long tail in moderately dense fluids is slightly faster than the power decay ($\sim 1/t$). We also compared our numerical data with the prediction of the self-consistent mode-coupling theory in the long time limit ($\sim 1/(t\sqrt{\ln t})$).

Masaharu Isobe
Nagoya Institute of Technology