

# Parallel Computation of Micro Fluid Dynamic Problems

Nobuyuki Satofuka\*, Koji Morinishi and Keigo Kamitsuji

Department of Mechanical and System Engineering,  
Kyoto Institute of Technology,  
Matsugasaki, Sakyo-ku, Kyoto 606-8585 Japan

The paper deals with a kinetic approach to micro CFD, especially to computation of low speed micro channel flows. The approach starts from Boltzmann equation instead of the Navier-Stokes equations on which the conventional CFD is based. A numerical method for solving the kinetic equation which models the Boltzmann equation has been developed. Computation of the present approach with the DSMC simulation and the numerical solution of the Navier-Stokes(NS) equations for pressure-driven plane poiseuille flow is presented. As is shown in Figure 1, the present result agrees quite well with those of the DSMC method for a high Mach number of  $M_a \approx 0.5$ . It is noticeable that present approach could be applicable to even lower Mach number case of  $M_a = 0.01$  without any difficulty. The present method is parallelized by using domain decomposition and implemented on a parallel computer at ITBL using MPI. Further results for micro channel flows will be presented at the conference.

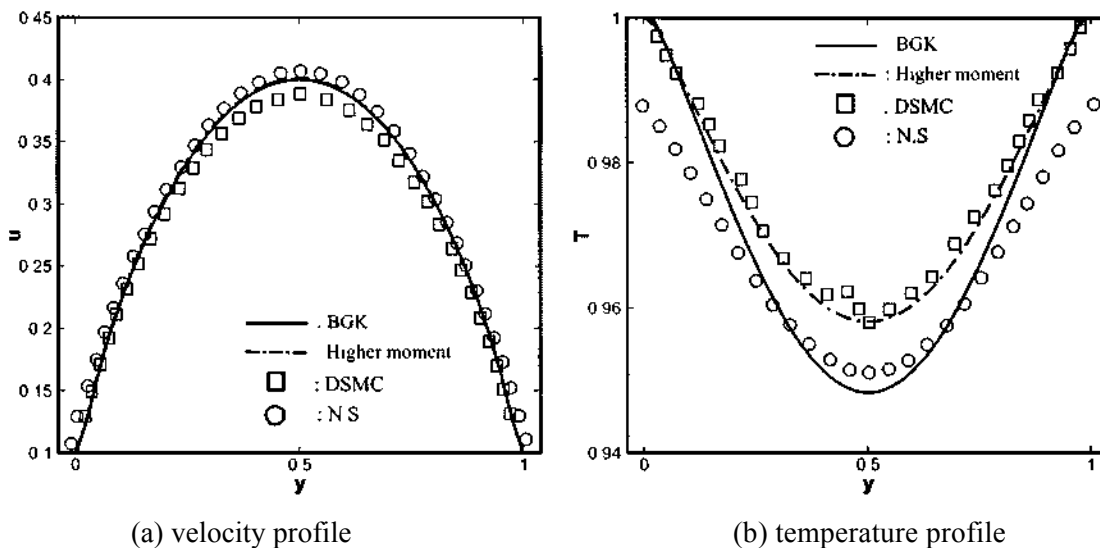


Figure 1: Velocity and temperature profiles.

\* Corresponding author. E-mail: satofuka@ipc.kit.ac.jp