# Rheology of non-colloidal liquid-particle suspensions

J. Hyväluoma[1], T. Kemppinen[1,2], P. Raiskinmäki[1], A. Koponen[1], M. Kataja[1], J. Timonen[1], and M. Toivakka[2]
[1]Department of Physics, University of Jyväskylä, Finland
[2]Laboratory of Paper Coating and Converting, Åbo Akademi University, Finland

ABSTRACT

Pressure-driven flow of a three-dimensional liquid-particle suspension confined between two parallel plates was solved numerically using the lattice-Boltzmann method. The results were compared with experimental ones for the capillary rheometry. Numerical results indicate lateral migration of particles towards the center of the channel and formation of a particle-free lubrication region next to the walls. The resulting concentration profile leads to an apparent shear thinning behaviour of the suspension with a corresponding non-parabolic velocity profile. The local viscosity across the channel depends on the local particle concentration and obeys the Krieger–Dougherty formula. The numerical results are in qualitative agreement with those for real non-colloidal suspensions in similar capillary flow conditions.