Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Particle-Based Methods for Fluid Dynamics Simulation. PAVEL KUDINOV, NAM DINH, Royal Institute of Technology (KTH), Sweden — Meshless finite-mass particle-based methods have showed attractive numerical features and potential to serve as computational platform for multiphase fluid dynamics problems with complex topological patterns and interfacial breakup. At their foundation, the particle methods are built on the Lagrangian concept of fluid tracer which, intuitively, is highly physical. Using the tracer to represent a real fluid mass is however problematic, as complex flow involves shearing and stretching, where fluid-element deformation and eventually mixing/dissolution are inherently incompatible with the finite-mass undeformable particle treatment. In this paper we examine the applicability of two particle methods (SPH, MPS) by relating their solution accuracy to the particle residence time scale in selected test problems in confined and free-surface geometry. We propose a novel algorithm of a dynamically-corrected particle method to effectively increase the solution accuracy in long transients, and discuss preliminary results of the method implementation and testing.

Pavel Kudinov
Royal Institute of Technology (KTH), Sweden

Date submitted: 04 Aug 2006 Electronic form version 1.4