CODE BLUE: Three dimensional massively-parallel simulation of multi-scale configurations[1] DAMIR JURIC, LIMSI, CNRS, France, LYES KAHOUADJI, Imperial College London, JALEL CHERGUI, LIMSI, CNRS, France, SEUNGWON SHIN, Hongik University, South Korea, RICHARD CRASTER, OMAR MATAR, Imperial College London — We present recent progress on BLUE, a solver for massively parallel simulations of fully three-dimensional multiphase flows which runs on a variety of computer architectures from laptops to supercomputers and on 131072 threads or more (limited only by the availability to us of more threads). The code is wholly written in Fortran 2003 and uses a domain decomposition strategy for parallelization with MPI. The fluid interface solver is based on a parallel implementation of a hybrid Front Tracking/Level Set method designed to handle highly deforming interfaces with complex topology changes. We developed parallel GMRES and multigrid iterative solvers suited to the linear systems arising from the implicit solution for the fluid velocities and pressure in the presence of strong density and viscosity discontinuities across fluid phases. Particular attention is drawn to the details and performance of the parallel Multigrid solver.

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