

Many-Parallel-Task Computing for a Hybrid Subsurface Model

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Abstract. A hybrid subsurface model that couples continuum and pore-scale simulators is being developed at Pacific Northwest National Laboratory. Continuum-scale models have been used to study subsurface flow, transport, and reactions for many years. More recently, pore-scale models, which operate at scales of individual soil grains, have been developed to more accurately model pore-scale phenomena, such as precipitation or fractures, which may not be well represented at the continuum scale. Mathematical approaches for coupling models across these scales have also recently been developed. A suite of planned simulations will involve executing pore scale simulations at each iteration of the continuum model. Each pore-scale iteration will involve multiple separate pore scale domains, each executing in parallel and thus involving multi-level parallelism. We will describe our recent advances both in building scalable, componentized continuum and pore-scale simulators as well as our approach and the challenges of running the coupled model as a “many-parallel-task” application.