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Load Balancing Strategies for Multiphase Flows on Structured Grids KRISTOPHER OLSHEFSKI, MARK OWKES, Montana State University — The computation time required to perform large simulations of complex systems is currently one of the leading bottlenecks of computational research. Parallelization allows multiple processing cores to perform calculations simultaneously and reduces computational times. However, load imbalances between processors waste computing resources as processors wait for others to complete imbalanced tasks. In multiphase flows, these imbalances arise due to the additional computational effort required at the gas-liquid interface. However, many current load balancing schemes are only designed for unstructured grid applications. The purpose of this research is to develop a load balancing strategy while maintaining the simplicity of a structured grid. Several approaches are investigated including brute force oversubscription, node oversubscription through Message Passing Interface (MPI) commands, and shared memory load balancing using OpenMP. Each of these strategies are tested with a simple one-dimensional model prior to implementation into the three-dimensional NGA code. Current results show load balancing will reduce computational time by at least 30%.

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