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Dynamic Load Balancing Strategies for Parallel Reacting Flow Simulations PATRICK PISCIUNERI, ESTEBAN MENESES, PEYMAN GIVI, Univ of Pittsburgh — Load balancing in parallel computing aims at distributing the work as evenly as possible among the processors. This is a critical issue in the performance of parallel, time accurate, flow simulators. The constraint of time accuracy requires that all processes must be finished with their calculation for a given time step before any process can begin calculation of the next time step. Thus, an irregularly balanced compute load will result in idle time for many processes for each iteration and thus increased walltimes for calculations. Two existing, dynamic load balancing approaches are applied to the simplified case of a partially stirred reactor for methane combustion. The first is Zoltan, a parallel partitioning, load balancing, and data management library developed at the Sandia National Laboratories. The second is Charm++, which is its own machine independent parallel programming system developed at the University of Illinois at Urbana-Champaign. The performance of these two approaches is compared, and the prospects for their application to full 3D, reacting flow solvers is assessed.

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