1161-76-123 **John Gounley*** (gounleyjp@ornl.gov). *Reducing time-to-solution in lattice Boltzmann simulations via regularization.*

The lattice Boltzmann method (LBM) is a popular numerical method for solving the Navier-Stokes equations in fluid and fluid-structure interaction simulations. The method differs from traditional solvers by tracking the evolution of a particle distribution function instead of hydrodynamic variables. On high performance computing systems, lattice Boltzmann methods are bandwidth-bound, with computational performance largely determined by the time required to transfer the LBM particle distribution function to and from memory at each timestep. This presents a particular challenge for high-order, multi-speed LBM lattices which involve significantly more particle distribution components per lattice site. In this talk, we address this challenge by applying a regularization process that allows for the LBM particle distribution to be stored in an effectively lossless compressed format. While LBM regularization was originally developed to improve simulation stability, we show that regularized-based compression can be used to improve simulation time-to-solution as well. This is joint work with Madhurima Vardhan and Amanda Randles (Duke University), Luiz Hegele (Santa Catarina State University), Erik Draeger (LLNL), and Shirley Moore (ORNL). (Received August 14, 2020)