**Maestro and Castro: Simulation Codes for Astrophysical Reacting Flows**Michael Zingale, Ann Almgren, Maria G. Barrios Sazo, Vince Beckner, John Bell, Doreen Fan, Brian Friesen, Adam Jacobs, Max Katz, Chris Malone, Andy Nonaka, Donald E. Willcox, Weiqun Zhang
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**Abstract**

Stellar explosions are multiphysics problems modeling them requires the coordinated input of gravity solvers, reaction networks, transport, and hydrodynamics together with microphysics recipes to describe the physics of matter under extreme conditions. Furthermore, these models involve following a wide range of spatial and temporal scales, which puts tough demands on simulation codes. We developed the codes Maestro and Castro to meet the computational challenges of these problems. Maestro uses a low Mach number formulation of the hydrodynamics to efficiently model convection. Castro solves the fully compressible radiation hydrodynamics equations to capture the explosive phases of stellar phenomena. Both codes share the same microphysics and use the AMReX library to provide adaptive mesh refinement and manage the parallelism.