

Abstract Submitted
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The HYDRA DCA Atomic Kinetics Package¹ MEHUL V. PATEL, HOWARD A. SCOTT, MICHAEL M. MARINAK, Lawrence Livermore National Laboratory — HYDRA is a multi-physics, 2D/3D radiation hydrodynamics design code that is routinely used to simulate inertial confinement fusion (ICF) experiments. HYDRA's in-line NLTE atomic kinetics capabilities include an average-atom treatment (XSN) and a newer super-configuration based treatment that incorporates the kinetics and screened hydrogenic models from CRETIN (DCA). We will discuss the HYDRA-DCA package and highlight recent updates: physics improvements in the kinetics package/models, HYDRA support for NLTE equations of state, and support for mixed-cell advection. HYDRA-DCA has been validated against tabulated opacities (LTE) and compared to XSN (NLTE) for ICF-relevant materials. Results from HYDRA simulations of recent National Ignition Facility Hohlraum experiments (DCA modeling of gold) as well as capsule design calculations (DCA modeling of germanium dopant) will be presented. In making comparisons between NLTE models and against experiment, we are able to assess the physics and modeling parameters that have the largest impact on our integrated simulation results.

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