

Abstract Submitted
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Approaches to Simulating the Prompt Electromagnetic Pulse¹

ALEX FRIEDMAN, BRUCE I. COHEN, CHESTER D. ENG, WILLIAM A. FARMER, DAVID P. GROTE, HANS W. KRUGER, DAVID J. LARSON, LLNL — LLNL is developing a suite of modern tools for simulating the generation and propagation of the prompt (E1) electromagnetic pulse (EMP). These include the 3-D EMPulse code, based on PIC methods with a Cartesian grid in the laboratory frame [1], and a companion 3-D approach which builds on the methods used in Longmire's fast-running CHAP code [2]. In CHAP, and in our own CHAP-lite [3], 1-D spherical symmetry is assumed, and the calculation takes advantage of a separation of scales. The independent coordinates are (r, τ) , where r is the distance from the source and $\tau = t - r/c$; the pulse varies slowly with r at fixed τ , so a coarse radial grid can be used. We seek similar efficiencies in 3-D, incorporating non-spherically-symmetric physics via a vector spherical harmonic decomposition. For each (l, m) harmonic, the radial equation is similar to that in CHAP-lite. We describe this approach, along with other aspects of our project. [1] B. I. Cohen, et. al., *this Conference*. [2] C. L. Longmire, *IEEE Trans. Electromagnetic Compatibility* **20** no. 1, 3 (1978). [3] W. A. Farmer, et al., *IEEE Trans. Nuclear Science* **63**, 1259 (2016).

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Alex Friedman
LLNL

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