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Forward modeling of Doppler velocity interferometer and detector blurring for improved high time resolution shockwave measurement[1]
DAVID ERSKINE, Lawrence Livermore Natl Lab — When near-instantaneous shocks are recorded by a Doppler velocity interferometer (VISAR) they typically exceed the detector's ability to react, and "skipped fringes" result where its visibility briefly reduces. Because of this, use of long but sensitive delays has traditionally been avoided, which can decrease velocity precision for later portions of data. Deciding placement of replaced skipped fringes traditionally required guesswork, which increased arrival time errors. While loss of information occurs, this is often partial, and we have learned to utilize the residual blurred fringe phase and magnitude information to produce a more precise arrival time of the shock. We describe a forward model of the interferometer and detector blurring that assists with VISAR fringe analysis at skipping events: (1) more precise shock arrival times, even with long delays, and (2) improved ghost subtraction (which improves accuracy over a broad time region). We demonstrate the utility of forward modeling on NIF or Omega shots.

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