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Non-iterative determination of the stress-density relation from ramp wave data through a window[1] EVAN DOWLING[2], DAYNE FRATANDUONO, DAMIAN SWIFT, Lawrence Livermore National Laboratory — In the canonical ramp compression experiment, a smoothly-increasing load is applied the surface of the sample, and the particle velocity history is measured at interfaces two or more different distances into the sample. The velocity histories are used to deduce a stress-density relation by correcting for perturbations caused by reflected release waves, usually via the iterative Lagrangian analysis technique of Rothman and Maw. We previously described a non-iterative (recursive) method of analysis, which was more stable and orders of magnitude faster than iteration, but was subject to the limitation that the free surface velocity had to be sampled at uniform intervals. We have now developed more general recursive algorithms suitable for analyzing ramp data through a finite-impedance window. Free surfaces can be treated seamlessly, and the need for uniform velocity sampling has been removed. These calculations require interpolation of partially-released states using the partially-constructed isentrope, making them slower than the previous free-surface scheme, but they are still much faster than iterative analysis.

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