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A Particle Method For Continua LARRY LIBERSKY, Los Alamos National Laboratory, PHILLIP RANDLES, Defense Threat Reduction Agency —
We present a new numerical method for application to problems involving strong shocks in solids. The technique (Dual Particle Dynamics) uses particles and no background spatial grid enabling computation of large material deformation in a Lagrange frame. A new tensor viscosity has been formulated which is effective in resolving shocks within a meshfree framework with large anisotropy in the particle spacing. An important attribute of the method is that each DPD particle carries, in addition to the physical fields, a ruler and a clock. The ruler defines the local special metric (length scale) and the clock provides for asynchronous time integration. These space-time measures are advantageous for computational efficiency, but more importantly for stability, as a time step based on the Courant number is not adequate to ensure stability for Lagrange particle codes. Simulations involving explosively driven shocks in metals are presented to show how the method performs.

Larry Libersky
Los Alamos National Laboratory

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