Abstract Submitted
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Compressible fluid response to extremely rapid thermal power deposition.[1] DAVID KASSOY, University of Colorado — "Gasdynamics of explosions is... best defined as the science dealing with the interrelationship between energy transfer occurring at a high rate in a compressible medium and the concomitant motion set up in the this medium" (Oppenheim, A.K.and Soloukhin, R.I.,1973, "Experiments in Gasdynamics", Ann. Revs. Of Fluid Mechs., **5**, 31-55,). Asymptotic modeling is used to show that the interaction depends on the ratio of the dimensional time scale for substantial chemical heat release, t_H', into a local region of length scale l', and local acoustic time t_A'= l '/a' where a' is the local speed of sound. When $t_H'/t_A' << 1$ local heat addition occurs in a nearly constant volume process (local inertial confinement) with a low Mach number fluid response. The temperature rise is accompanied by a concomitant pressure rise, so that for a brief instant a hot, high-pressure spot exists in a relatively low pressure and temperature environment. Subsequent expansion of the spot on the t_A'-time scale, driven by the large pressure gradient between the spot and the environment is the source ("piston" effect) of compression waves in the environment. Wave coalescence can lead to shock wave formation.

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