Abstract Submitted
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Development of numerical model to investigate the laser driven shock waves from aluminum target into ambient air at atmospheric pressure and its comparison with experiment[1] PREM KIRAN PATURI, SAI SHIVA SAKARABOINA[2], LEELA CHELIKANI, ACRHEM, University of Hyderabad, VENKATA RAMANA IKKURTHI, SIJOY C.D., SHASHANK CHATURVEDI, Computational Analysis Division, Bhabha Atomic Research Centre (BARC), Visakhapatnam, ACRHEM COLLABORATION, CAD COLLABORATION — A one-dimensional, three-temperature (electron, ion and thermal radiation) numerical model to study the laser induced shock wave (LISW) propagation from aluminum target in ambient air at atmospheric pressure is developed. The hydrodynamic equations of mass, momentum and energy are solved by using an implicit scheme in Lagrangian form. The model considers the laser absorption to take place via inverse-bremsstrahlung due to electron-ion (e-i) process. The flux limited electron thermal energy transport and e-i thermal energy relaxation equations are solved implicitly. The experimental characterization of spatio-temporal evolution of the LISW in air generated by focusing a second harmonic (532 nm, 7ns) of Nd:YAG laser on to surface of Al is performed using shadowgraphy technique with a temporal resolution of 1.5 ns. The radius of SW (2 - 5 mm) and its pressure (40 – 80 MPa) observed in the experiments over 0.2 μs-10 μs time scales were comparable with the numerical results for laser intensities ranging from 2.0×10^{10} to 1.4×10^{11} W/cm^2.

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