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Modeling of laser induced air plasma and shock wave dynamics using 2D-hydrodynamic simulations.[1] PREM KIRAN PATURI[2], SAI SHIVA S, LEELA CHELIKANI[3], ACRHEM, University of Hyderabad, VENKATA RAMANA IKKURTHI, SIJOY C. D., SHASHANK CHATURVEDI[4], Computational Analysis Division, Bhabha Atomic Research Centre, Visakhapatnam, ACRHEM, UNIVERSITY OF HYDERABAD TEAM, COMPUTATIONAL ANALYSIS DIVISION, BHABHA ATOMIC RESEARCH CENTRE, VISAKHAPATNAM TEAM
— The laser induced air plasma dynamics and the SW evolution modeled using the two dimensional hydrodynamic code by considering two different EOS: ideal gas EOS with charge state effects taken into consideration and Chemical Equilibrium applications (CEA) EOS considering the chemical kinetics of different species will be presented. The inverse bremsstrahlung absorption process due to electron-ion and electron-neutrals is considered for the laser-air interaction process for both the models. The numerical results obtained with the two models were compared with that of the experimental observations over the time scales of 200 – 4000 ns at an input laser intensity of 2.310^{10} W/cm^2. The comparison shows that the plasma and shock dynamics differ significantly for two EOS considered. With the ideas gas EOS the asymmetric expansion and the subsequent plasma dynamics have been well reproduced as observed in the experiments, whereas with the CEA model these processes were not reproduced due to the laser energy absorption occurring mostly at the focal volume.

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