Recent investigations on radiative shocks interacting with an obstacle

Th. Michel[1], E. Falize[2,3], B. Albertazzi[1], G. Rigon[1], P. Mabey[1], Y. Sakawa[4], T. Sano[4], R. Kumar[4], H. Shimogawara[5], M. Ota[5], S. Egashira[5], K. Fukui[10], T. Morita[6], C. Michaut[7], A. Casner[8], P. Barroso[9], F. Lefevre[1], Y. Kuramitsu[10], S. Laffite[2], L. Van Box Som[2,3], G. Gregori[11], R. Kodama[4,10], N. Ozaki[10], P. Tzeferacos[12], D. Lamb[12] and M. Koenig[1,10]

[1] LULI - CNRS, Ecole Polytechnique, CEA, Université Paris-Saclay, F-91128 Palaiseau Cedex, France
[2]CEA-DAM-DIF, F-91297 Arpajon France
[3] CEA/DRF - CNRS - Université Paris Diderot, IRFU/DAp Centre de Saclay, F-91191 Gif-sur-Yvette, France
[4] Institute of Laser Engineering, Osaka University, Suita, Osaka 565-0871, Japan
[5]Department of Earth and Space Science, Osaka University, Suita, Japan
[6]Faculty of Engineering Sciences, Kyushu University, Kasuga, Fukuoka, Japan
[7]LUTH, Observatoire de Paris, CNRS, 92190 Meudon, France
[8]CELIA, CNRS-CEA, Université de Bordeaux, F-33405 Talence, France
[9]GEPI, Observatoire de Paris, CNRS, 75014 Paris, France
[10]Graduate School of Engineering, Osaka University, Suita, Osaka, Japan
[11]Clarendon Laboratory, University of Oxford, Oxford OX1 3PU, United Kingdom
[12]Flash Center for Computational Science, University of Chicago, Illinois, USA

Radiative shocks (RS) are phenomena widely observed in astrophysics, for example in supernovae remnants or supersonic jets. Moreover, massive stars (O and B stars) surrounding molecular clouds involve many radiation hydrodynamics processes. Here, we present experimental results obtained on highly radiative shocks (with a velocity up to 150 km/s) generated in a low-density gas filled cell obtained on the GEKKO XII laser facility. The RS was generated by using an ablator-pusher target (CH/Au/Ti), designed to limit as much as possible the preheating produced by the hot corona. The propagation media was Xe or He gas, with the aim to compare radiative effects in each medium.

Thanks to self-emission and visible probe diagnostics, we were able to analyze several aspects of the RS. First, a high electron density in the upstream region due to a radiative precursor is highlighted. Interaction between the radiative precursor and a solid obstacle (a quartz micro-balloon or an aluminum foil, mimicking a molecular cloud) has been studied both experimentally and theoretically. In addition, these results allow the characterization of the RS propagation, especially radiative effects and how they affect hydrodynamics.

References

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