LBNL-61441 Abs.
HIFAN 1536a

Surface effects and droplet evolution in a liquid/vapor flow of aluminum heated by a heavy ion beam for Warm Dense Matter studies.

Julien Armijo[1], John Barnard[2], Richard More[1]
[1] Lawrence Berkeley National Laboratory [2] Lawrence Livermore National Laboratory

4.7.0 – 4.7 Equations of state of HEDP
T – Theoretical
POSTER

We have made estimates of surface effects and droplet evolution in the two-phase flow that should be observed in the upcoming foil heating experiments planned for the NDCXII machine at LBNL. An aluminum foil of order micron thickness will be heated by a heavy ion beam to the 1 eV range. The expansion will take place in the two-phase regime, so the heated metal will first melt, then fragment into droplets, and then the droplets will undergo some evaporation. We propose hydrodynamic criteria to estimate the maximum size of the droplets (~100 nm), considering a balance between hydrodynamic disruptive forces and restoring surface tension. We estimate the relevant thermodynamic functions (surface tension, latent heat, viscosity) for temperatures up to the critical temperature, and we use then to make a simple model for the partial or total evaporation of a droplet in the expanding flow.