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Modeling the Dependence of Laser Ablated Plume Dynamics on Target Material[1] MIKHAIL FINKO, University of Illinois at Urbana-Champaign, Lawrence Livermore National Laboratory, DAVIDE CURRELI, University of Illinois at Urbana-Champaign, JONATHAN CROWHURST, WESLEY KELLER, DAVID WEISZ, ARIC ROUSSO, BATIKAN KOROGLU, TIMOTHY ROSE, HARRY RADOUSKY, Lawrence Livermore National Laboratory — Recently acquired high-resolution ICCD images of ns laser ablation plumes suggest a strong correlation between the formation of internal plume structures and the type of material being ablated. This observation brings up the possibility of inferring the composition of an ablation plasma based on the observed plume dynamics. However, the details of this relation are currently not well understood. In this work, we attempt to explore this correlation using a 2D reactive compressible fluid model to study the dependence of internal plume structure formation on the ablation material. Spatio-temporal emission maps and plume expansion velocities from experimental measurements are compared with the model predictions, and the impact of plasma and gas phase material parameters on the plume dynamics is explored. This effort constitutes a continued development towards a predictive model of ablation plume dynamics and chemistry for various materials in extreme environments.

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