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Hydrodynamics of laser-driven shock interaction with a deformable particle[1] NITISH ACHARYA, JESSICA SHANG, HUSSEIN ALUIE, University of Rochester — We present a numerical study of laser-driven shock interaction with a single deformable particle embedded in a polystyrene target for post-shock pressures up to 50 GPa. Numerical simulations are carried out using multi-physics radiation-hydrodynamics code FLASH that solves Euler's equations for compressible flow. We model the particle using a modified ideal gas equation state to mitigate the overestimation of compressibility in the code. We present the time evolution of pressure field, wave patterns in the flow and particle compression. Particle deformation is quantitatively characterized using time evolution of characteristic length scales of particle interface. Additionally, the motion of lagrangian tracers inside the particle is used to understand the inviscid momentum transfer from the shocked medium into the particle. The particle is accelerated to a considerable velocity as it gets traversed by the shock front. Finally, the study is carried out to investigate the flow field and the particle response for various combinations of particle sizes, particle densities and host-particle shock-impedance ratios.

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