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3D simulations of thermally induced expansion of beryllium microstructure in gas–filled NIF ignition targets[1] M.M. MARINAK, N.R. BARTON, R. BECKER, S.W. HAAN, J.D. SALMONSON, Lawrence Livermore National Laboratory — X-ray preheat in the baseline gas-filled NIF ignition target is calculated to heat solid portions of the beryllium ablator hundreds of degrees Kelvin. Anisotropy in the resulting thermal expansion, due to crystal properties, causes the interfaces between the beryllium and cryogenic fuel, as well as the internal beryllium interfaces, to distort before the grains are melted by passage of the first shock. We quantify these effects for the full duration of the implosion. A 3D polycrystalline model is employed in ALE3D, a multiphysics arbitrary Lagrange Eulerian code, to calculate this expansion and the response to the first shock. It models the anisotropic elastic and plastic response, resolving individual grains. Perturbations in the fields and interfaces are then linked to a 3D HYDRA simulation of the remainder of the implosion. High-resolution simulations resolve modes up to $\ell \approx 2000$. These perturbations add to those originating from the native roughness on the embedded interfaces. We compare the magnitudes and spectral content of the different perturbation seeds.

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